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BSTRACT

Fifty-four standardized tests and subtests are xamined, including achievement batteries, specific domain tests, and riterion-referenced tests. Individual test items are examined for heir relationship to curriculum objectives developed by the Ministry f Education, Ontario for grades 7, 8, 9, and 10. The objectives are xamined in four subject areas: English, science, geography and istory. (MH)

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MEASURING ACHIEVEMENT AT THE INTERMEDIATE LEVEL

An Analytical Review of Test Instruments Used in Evaluating Student Achievement in English, Science, History, and Geography

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Abstract

This study examines the items of 54 standardized tests and subtests which include achievement batteries, specific domain tests, and criterion-referenced instruments. Individual test items were examined for the degree of congruence with the objectives in the curriculum guidelines for the Intermediate grades (7, 8, 9, and 10) recently developed by the Ministry of Education, Ontario. The guidelines in four subject areas were examined: English, Science, Geography, and History. Each test item was classified as directly related, indirectly related, or not related to the curriculum objectives and the results of the analysis have been summarized in the body of this report.

In English the items from 27 tests were analysed and the results revealed that objectives in reading were measured by more items than any other area of language development. Vocabulary, word skills, and writing skills were also measured by a large number of items. The values objectives were related only sparsely and indirectly to test items and the areas of speaking and creative writing were not measured by any test items.

In Science 3 of the 11 tests analysed related to a broad range of the content areas specified in the objectives: the Cooperative Science Tests, the Sequential Tests of Educational Progress, and the SRA Assessment Survey. The areas most frequently measured were astronomy, rocks and minerals, weather, and interdependence at the elementary level, and matter, electricity, optics, and viruses at the secondary level. Many of the test items were found to use inappropriate terminology.

In History a very small number of test items in the 8 tests were related to any of the curriculum objectives. The few items which were found to relate to the guideline measured two objectives - "Using library

4

and resource materials" and "Evaluating and interpreting evidence". Most test items were classified as unrelated because of the emphasis on American History.

In Geography 2 of the 8 tests measured a broad range of objectives: the Canadian Tests of Basic Skills and the Sequential Tests of Educational Progress. The most frequently measured objectives were those dealing with the use of an atlas, charts, and graphs, to derive information. Many objectives at all grade levels were not measured by any test items.

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Acknowledgements

The primary task that forms the body of this report was the analysis of test items in the numerous standardized tests in each subject area. Collectively, the group of subject specialists carried out this analysis most thoroughly, rigorously and efficiently. Their contribution to this report is most significant. We were fortunate to find subject specialists with experience at the Intermediate level and who also were involved in development of the new Intermediate guidelines. We are indebted to a number of curriculum officers at the Ontario Ministry of Education who willingly helped identify these subject specialists who would be able to complete the analysis of this report.

The English test items were analysed by William Moore, Hamilton Board of Education and Howard Reynolds, York County Board of Education. Because of the smaller number items and tests in Science, Geography, and History only one subject specialist completed the analysis in each subject area and all three are from the Toronto Board of Education. Lynn McMurray completed the analysis in Geography, Alan Skeoch analysed the test items in History and Dr. Frank Mustoe was responsible for the analysis in Science.

Helen Hayes, Research Officer in the Curriculum Department at OISE was a valuable member of the project team whose writing skills, analysis skills, and meticulous attention to detail helped the high degree of accuracy of the final report.

A good deal of credit for the final form of this report is due three people who worked diligently and efficiently on the many secretarial and typing tasks. Special credit and appreciation must go to Carolyn Symes and we also appreciate the effort of Jeannie Regan and Nancy Fayder in the latter stages of the final copy.

Merl Wahlstrom
Ray Danley

1 Summary

INTRODUCTION

The Ministry of Education, Ontario, has indicated that it intends to provide all levels in the education system with practical information that will help determine whether curriculum objectives are being met, and to assist in bringing about improvement where required. A Ministry work group on evaluation in 1977 supported this intention by reporting that an important objective of any evaluation program is to provide information about the extent to which provincial objectives are being met. This work group further recommended that there should be developed a bank of specific objectives and corresponding test items and instruments based on curriculum objectives that would be available to teachers for their use in the diagnostic testing of students.

The terms of reference of this study deal directly with these concerns. The primary purpose of this study is to analyse test items in currently available standardized tests to determine the extent to which these test items measure the objectives in the recently revised curriculum guidelines for the Intermediate Division. This study matches test items with objectives in four subject areas: English, Science, Geography, and History. The item-objective analysis also indicates those objectives which are not measured by any test items in currently available standardized tests.

PROCEDURES

The project team collected all available standardized, achievement tests in English, Science, History, and Geography from sources readily accessible to Ontario educators - the principal source being The Guidance Centre. The 54 tests and subtests which were collected included test batteries, specific subject area tests, and criterion-referenced tests.

The task of analysing test items in relation to curriculum objectives requires a subject specialist with a high degree of specialization in a particular subject area, experience and first-hand knowledge of teaching at the Intermediate Division, a knowledge of the practical problems related to testing and test construction, and most important, an active involvement in the development of the new Intermediate guidelines in their particular subject area. Subject specialists in each subject area with the above qualifications were contracted to complete the item-objective analysis.

An identification system was designed for the objectives in each subject area. Each test item was then categorized as being either directly related, indirectly related or unrelated to the list of objectives. The results of the analysis were described in three forms: first, a written description which summarizes the important aspects of the match between test items and objectives; second, a summary chart which displays the total number of items related to the objectives; and third, a table which identified the specific items related, both directly and indirectly, to the individual objectives.

RESULTS OF ITEM ANALYSIS

English

A total of 27 tests were analysed. These tests include 10 batteries which have a number of subtests, including Reading Comprehension, Vocabulary, Expression, and Usage (Spelling, Punctuation, and Grammar). Thirteen tests which focus exclusively on the skills of reading were analysed. Two criterion-referenced tests were analysed, as well as one test in literature skills and one test in vocabulary knowledge. Only one listening test was analysed, while speaking and creative writing skills were not measured by any test items because of the nature of these objectives which cannot be measured by paper-and-pencil standardized items.

The Thinking objectives most frequently measured are observation/recall and comprehension/analysis. Tests of Reading Comprehension tend to measure the ability to respond to questions, make inferences, and develop logical trains of thought. Understanding the aspects of thinking and developing criteria to evaluate ideas are not measured by any of the test items analysed.

There are four categories of Reading objectives in the English guideline: attitudes, processes, vocabulary, and rate. The skills of the Reading processes are measured by the majority of items in tests of Reading Comprehension. Specifically, these skills are to focus attention on meaning, to obtain and use information proficiently and to follow complex syntax and organizational patterns. Vocabulary and word skill objectives are measured by a large number of objectives in subtests of Vocabulary, Study Skills, and the Use of Sources. Only one test measures directly the rate of a students' reading but indirectly all Reading Comprehension subtests are related to rate of reading.

Only one set of Writing objectives is measured by any significant number of test items - the use of writing skills commensurate with the student's physical, intellectual, and emotional maturity. Tests of Expression and Usage (Spelling, Punctuation, and Grammar) bear a direct relationship to the objectives of proficiency in spelling, punctuation, and the use of standard conventions in written English. There are very few other test items which relate to the remainder of the Writing objectives.

Values objectives, although difficult to measure with a standardized test, are indirectly measured by a few tests of Reading Comprehension where items deal with an appreciation of the role language plays in developing perception and understanding of the world. There are no test items related to developing awareness of the relationship between thought and language, growing in understanding of one's cultural heritage or recognizing the power of language for enriching one's life.

In general terms, the test items in English are directly related to the skills of the reading and writing, with very few items related to speaking skills, listening skills or values in English.

Science

There are 44 content areas in the Science objectives for the Intermediate grades--21 areas at the elementary level and 23 areas at the secondary level. Of these, 8 content areas are measured by a large number of test items: astronomy, rocks and minerals, weather, and interdependence for grades 7 and 8, and matter, electricity, geometric optics, viruses, monerans, and protists for grades 9 and 10. Eleven elementary content areas and 9 secondary content areas are not measured by any, or by very few, test items.

Three Science tests were found to be most comprehensive in relating to a broad range of the objectives: the Cooperative Science Tests, the Sequential Tests of Educational Progress, and the SRA Assessment Survey. The other 8 tests in Science relate to a restricted number of content areas because of the specific nature of the test items.

In each Science test there are a significant number of items which are not related to any objective and, in addition, a number of items use inappropriate terminology or spelling.

History

Only 8 tests had items relating to History. These are the same 8 tests that were analysed for Geography in that the test items relate to both subject areas and are found in larger test batteries as subtests entitled Social Studies or Social Science.

Very few items in any of the 8 tests relate to the objectives in History. This is primarily because the content of the test items assesses a student's knowledge and skills of American History, while many of the items relate to knowledge and skills in Geography. Most of the test items are categorized as unrelated.

The objective dealing with the use of library and resource materials is the most frequently measured objective. A few test items are related to a student's skill in evaluating and interpreting evidence, drawing conclusions based on evidence, synthesizing, and making judgments.

Geography

Only 8 tests had items relating to the Intermediate guideline in Geography. Two of these tests measure a broad range of objectives at all grade levels: the Canadian Tests of Basic Skills, with subtests in Map Reading and Using Graphs and Tables, and the Sequential Tests of Educational Progress. The Metropolitan Achievement Test also covers a fairly broad range of objectives.

The most commonly measured objectives are deriving information from atlas maps, presenting and deriving information from various sources, using thematic maps, and constructing and interpreting charts and graphs. Many of the objectives at all grade levels are measured very sparsely or not at all by any test items. This is due in part to the specific nature of the knowledge, skills, and attitudes embodied in the objectives, which cannot be measured readily using a paper-and-pencil, standardized instrument.

2 Introduction

BACKGROUND TO THE STUDY

In recent years, Ontario's approach to educational evaluation has tended to move away from uniform standardized testing practices towards a greater reliance on the judgment of individual teachers. This approach may be seen as a corollary to the policy of local curriculum development which has characterized education in Ontario since the late 1960s. While allowing for greater flexibility, it has also resulted in greater variability among school systems in the province, a variability which has seemed to many to reflect uncertainty regarding standards of student achievement.

Former Minister of Education, the Hon. Thomas L. Wells, in his statement to the Ontario Legislature on November 26, 1976, announced a plan intended to bring about better testing and evaluation of pupil achievement at the classroom level and better reporting of pupil progress to parents.

As outlined by the Minister, Ontario's approach to education had recently tended to move away from uniform standardized testing practices towards greater reliance on judgments of individual teachers. This approach, while leading to greater flexibility, also led to greater variability across school systems in the province. This variability in assessment procedures was viewed by many as reflecting a downgrading of standards in student achievement. This concern was expressed by the Ontario Teachers' Federation:

> There appears to be widespread concern about levels of academic progress and behavioural standards being achieved in the schools. We may have reached the time when a comprehensive survey of school standards is needed so that the remedial measures may be taken should these apprehensions prove to be well founded. (Report to the Cabinet by the Ontario Teachers' Federation, May 1976).

The three primary goals of the Ministry's evaluation program, as stated by the Minister on November 26, 1976, are:

> First, we want to help teachers to better diagnose any specific deficiencies in the levels of pupil achievement, especially in the basic skills, to help them improve classroom instruction and to work with individual students as required.
>
> Second, we want to give all levels in the education system practical information that will help determine whether curriculum objectives are being met, and to assist in bringing about improvement where required.
>
> Third, we want to give parents clear and understandable information about their children's progress and achievement, especially in the key basic skill areas, so that they can give assistance and encouragement at home, and more knowledgeably discuss things in a constructive way with teachers.

At the same time the Minister announced the establishment of a "work group" whose mandate was to devise

> a definite plan of action on how best to improve testing and evaluation in the classrooms, and how best to give teachers and parents a clear understanding of how their children are progressing, so that they will be able to provide appropriate assistance and encouragement as required.

This work group, chaired by Mrs. Claudette Foisy-Moon, Executive Assistant, Ontario Teachers' Federation, submitted a report on April 15, 1977, which included these comments on evaluation.

The objectives of any evaluation program in order of priority should be:

1. To provide information for the improvement of programs, either directly or through the improvement of policies affecting programs
   - (a) at the individual student and classroom level
   - (b) at the school board level
   - (c) at the provincial level
2. To provide the basis for reporting the progress of the student to the student and the parents.

3. To provide information as the basis of internal (school and system) reporting on the extent to which local program objectives are being met.
4. To provide information about the extent to which provincial objectives are being met.
5. To provide information that will lead towards an examination of the validity of objectives at any level.
6. To assist in meeting the accountability requirement at all levels.

It should be pointed out that the purpose of the present study is focused directly on objectives 3, 4, and 5 of the above statement.

This study is also directly related to one of the recommendations in the subsection on testing. Recommendation #2, p.16, states:

> there (should) be developed a bank of specific objectives and corresponding test items and instruments based on curriculum objectives that would be available to teachers for their use in the diagnostic testing of students.

A previous report by the same research team, entitled *Measuring Achievement at the Primary and Junior Levels: An Analytical Review of Test Instruments Used in Evaluating Pupil Achievement and Communicating Results to Parents*, consisted in part of an analysis of all standardized test items in relation to the curriculum objectives at the primary and junior levels. Recognizing the need for similar information in relation to the new Intermediate Guidelines which will shortly be distributed for implementation in 1978-79, the Ministry of Education requested an extension of the previous study.

TERMS OF REFERENCE

This research project is required to provide sufficient and reliable data to answer the following questions:

1. What commercially prepared standardized tests were available for use in the Intermediate Division?
2. To what extent do the items in the commonly used tests measure the objectives in the following curriculum guidelines for the Intermediate Division: English, Science, History, Geography, Mathematics?

3. To what extent are the objectives in the curriculum guidelines for the Intermediate Division measured by the commonly used standardized tests?
4. To what extent are test items not reflected in any objectives?

CURRICULUM GUIDELINES

Curriculum guidelines for the Intermediate Division (grades 7, 8, 9, and 10) are developed for each subject area. This study will examine the objectives in four subject areas: English, Science, History, and Geography. The guideline for each subject area is published separately and contains the curriculum policy for school programs at the Intermediate level in the schools of Ontario. The content of each document, presented in terms of objectives, has been developed over a number of years from the work of the Curriculum Revision Committees of the Intermediate Cyclic Review. In the course of each cyclic review, opinions, comments, and suggestions are solicited from thousands of Ontario citizens including teachers, subject specialists, parents, trustees, administrators, and other community interest groups. The fundamental question involved in these discussions is "What skills, knowledge, attitudes, and values ought to be taught to students in grades 7, 8, 9, and 10 in this particular subject area?"

The Curriculum Revision Committee in each subject area synthesizes these ideas and suggestions and integrates them with current educational knowledge and theory to develop a draft. This draft undergoes several phases of validation and review before it is finally printed and released to schools for implementation. The Intermediate guidelines in English, Science, History, and Geography that have been examined in this study have all been updated and revised and have been given to schools for a trial implementation during the 1977-78 school year. It is expected that the new guidelines will be printed with very few revisions and released officially for implementation in the 1978-79 school year.

STANDARDIZED NORM-REFERENCED ACHIEVEMENT TESTS

Achievement tests are instruments designed to measure academic knowledge and school experiences. In contrast to aptitude or intelligence tests, which are designed to predict future academic performance, achievement tests measure educational progress at time of testing. Achievement tests can be either comprehensive or specific. Comprehensive tests are designed to measure achievement in a number of areas such as mathematics, reading, vocabulary, etc. (e.g. Canadian Tests of Basic Skills). Specific achievement tests examine delineated areas of progress or skill such as reading or mathematics (e.g. Bobbs-Merrill Mathematics Tests).

Standardized norm-referenced tests are designed to compare an individual's achievement to currently available reference norms. The tests are carefully prepared to correspond to certain psychometric assumptions. First, items are chosen that appear to be related to some external criterion, possibly grades in school, or appear to have content validity as agreed upon by the test constructors. Second, items are usually tried out on a sample of children. Items that appear to have a difficulty level approximating .50 are retained; items that are too easy or difficult are dropped. Third, items must demonstrate a reasonable degree of reliability, usually through internal consistency, odd-even item reliability, or test-retest reliability.

In this study, only test items from currently available standardized norm-referenced tests were compared with objectives from the Intermediate guidelines.

3 Procedures

COMPILATION OF ACHIEVEMENT TESTS

The first task in preparing for item analysis was to identify and collect specimen sets of currently available standardized norm-referenced tests. The project team considered all possible sources of tests and set down a few parameters that would delimit the study to a manageable number of tests. First, we would examine tests which have been developed or revised in the last 15 years. It was felt that tests developed prior to this date would not reflect contemporary curricula or teaching methods and that norms would not be reliable for today's student population. Second, we would examine tests which are available through Ontario publishers or distributors. While it is true that there are a great many tests of reasonable quality developed in the United States, it was felt that availability was an important factor in the usefulness of our analyses. It did not seem reasonable to analyse tests which are not readily available to Ontario educators.

The principal source of tests for Ontario educators is The Guidance Centre. The Guidance Centre, which is associated with the Faculty of Education, University of Toronto, serves as a central clearing house for testing and guidance materials. The tests available from the Guidance Centre are those most widely used across North America. In addition to The Guidance Center we found five other sources for tests: Thomas Nelson, S.R.A., Addison-Wesley, Copp Clark, and Psychological Corporation of Canada (PSYCAN Limited). From these five sources, the project team collected all available tests in English, Science, History, and Geography at the Intermediate Level.

The 34 tests collected fall into three categories - test batteries which contain subtests in a number of subject areas e.g. Metropolitan Achievement Test, specific subject tests e.g. Dunning-Abeles Physics Test and Criterion-referenced tests e.g. Individual Pupil Monitoring System. This latter category is more properly called catalogues of objectives rather than actual tests. A criterion-referenced test can be developed specifically suited to a clients' program. The client selects a set of objectives from an expanded list and a test is constructed with 3 to 5 pretested items for each objective.

Here is a list of all 34 tests analysed in this study.

TEST BATTERIES

American School Achievement Tests - Advanced
Canadian Tests of Basic Skills - Form 4M
Content Evaluation Series
Iowa Tests of Educational Development
Metropolitan Achievement Tests
Sequential Tests of Educational Progress - Series II
Stanford Achievement Tests - Advanced
Stanford Test of Academic Skills - Levels I and II
S.R.A. Assessment Survey
Tests of Academic Progress

SPECIFIC DOMAIN TESTS

A. *English*

Cooperative English Tests
Cooperative Literature Tests
Davis Reading Test
Durrell Listening - Reading Series - Advanced
Gates - MacGinitie Reading Tests - Survey E
Gilmore Oral Reading Test
Gray Oral Reading Tests

Nelson-Denny Reading Test
Nelson Reading Skills Test
Pressey Diagnostic Reading Tests
S.R.A. Reading Record
Stanford High School Reading Test
Stanford Diagnostic Reading Test - Level III
Traxler Silent Reading Test
Wide Range Vocabulary Tests

B. *Science*

Cooperative Science Test
Dubins Earth Science Test
Dunning-Abeles Physics Test
Read General Science Test
Science Test - Content Evaluation Series

C. *History/Geography*

Cooperative Social Studies Test

CRITERION-REFERENCED TEST

Individual Pupil Monitoring System
Score
S.R.A. Mastery

SUBJECT SPECIALISTS

The task of comparing test items to curriculum objectives is a complex one which requires a very specialized set of knowledge, skills and experience. An educator ideally suited for this task would be someone with a high degree of specialization in a particular subject area, experience and first-hand knowledge of teaching at the Intermediate level, a knowledge of the practical problems related to testing and test construction, and most important, someone who had actively participated in the development of the new Intermediate guidelines in their subject area. Through previous experience in the comparison of test items with curriculum objectives it was clear that those analysing the test items needed to have a comprehensive understanding of the philosophy underlying the new guidelines. And so, the project team sought out subject specialists with experience at the Intermediate level who had participated in the months of discussion and deliberation wherein the philosophical tenets of the new guidelines are given form.

In each case the Ministry of Education official who chaired a curriculum development committee was extremely helpful in suggesting subject specialists who would be well suited to the item analysis task. With this assistance it was possible to obtain the services of outstanding subject specialists who also met all the other criteria required for the task.

The English test items were analysed by Bill Moore, Hamilton Board of Education and Howard Reynolds, York County Board of Education. Science objectives and test items were compared by Dr. Frank Mustoe, Toronto Board of Education, the History analysis was completed by Alan Skeoch, Toronto Board of Education and the Geography test items were analysed by Lynn McMurray, also of the Toronto Board of Education.

PROCEDURE FOR ITEM ANALYSIS

Before the item analysis was undertaken the subject specialists developed an identification system for the Intermediate objectives.

The identification system is unique for each subject area because of the format and organization of the objectives within each curriculum guideline. For example, the History guideline has a statement of very broad AIMS as well as more specific OBJECTIVES; whereas, the Mathematics guideline has only one set of objectives organized into 3 content areas - Numerical Methods, Algebra and Geometry. The identification system is described in the results of each subject area.

For each test the procedure followed three steps. First, the technical information and manuals were examined and a brief description was prepared which focusses on the purpose of the test and other information relevant to the subject area. Second, each item of the test was categorized as being either *directly* related to an objective, *indirectly* related to an objective or *unrelated* to any objective. The third and final step was to examine the analysis from an overall point of view and summarize the important aspects of the match between test items and objectives. From the Terms of Reference specifications, it is this summary section for each test which indicates the extent to which the items of the tests are reflected in the Intermediate guidelines and those areas of the guidelines which are not measured by any test items.

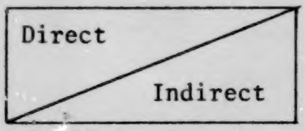
In addition, an overall summary has been made which brings together all the analyses of all the tests within each of the four subject areas.

4 Results: Item Analysis for English

PROCEDURE FOR ITEM ANALYSIS

The items of each standardized test were examined to determine the knowledge and skills a child would need to know in order to respond correctly to each item. Bearing this analysis in mind, the question was then asked: "Which objectives in the curriculum guideline for English would enhance the child's ability to answer the item correctly?" Using this global approach, several objectives may contribute to the child's ability in answering an item. Rather than using an "exclusive" approach, where the one most predominant objective related to a test item would be selected, an "exhaustive approach was used, where the entire range of objectives that could contribute to a child's correct response was identified.

Within those objectives related to a particular test item, some have far greater significance than others. However, this analysis does not attempt to give a rank ordering to the significance of related objectives. Instead, the analysis uses a bi-polar distinction between those objectives *directly* related to a test item and those objectives *indirectly* related to the same test item. The total number of items directly related to an objective is entered on the top of the diagonal and the number on the bottom of the diagonal indicates the total of indirect items related to an objective. This format is illustrated below.



The results of the item analysis for each standardized test are tabulated in two forms. The first form is a summary chart which displays visually the general areas being measured by the test items. In the summary chart the total number of items both directly and indirectly related to the objectives are listed using the format described above.

The second form is a table which identifies by the actual number of the test item the specific items related to each objective. In these tables, the items which are indirectly related to an objective are enclosed in brackets ( ).

OBJECTIVES OF ENGLISH LANGUAGE PROGRAMS IN THE INTERMEDIATE DIVISION

The objectives in English are related to six general areas: thinking (objective 1), listening (objective 2), speaking (objective 3), reading (objectives 4, 5, 6, and 7), writing (objectives 8, 9, and 10), and valuing (objective 11).

Under each of these 11 general objectives there are a number of more specific objectives. For the purposes of this analysis, each sub-objective has been given an identification number such as 1.1, 1.2, etc.

The objectives of the English program from the Ministry guideline and their identification numbers are listed below.

The English program will provide each student in the Intermediate Division with the opportunity to:

Think 1 *think about experiences, ideas, and feelings with increasing clarity, logic, and sensitivity;*

- 1.1 develop powers of observation and recall;
- 1.2 comprehend and analyse what is being communicated;
- 1.3 formulate and respond to questions of varying depth or range;
- 1.4 gather or research, interpret, integrate, and design and present ideas or information;
- 1.5 make inferences and develop logical trains of thought;
- 1.6 assess the relevance and credibility of evidence;
- 1.7 synthesize disparate pieces of information for a purpose;
- 1.8 recognize the role that knowledge, logic, intuition, and feeling play in the process of thinking or problem-solving;
- 1.9 understand the role of the media (film, radio, television, newspapers, journals, etc.) in shaping thought, attitudes, and habits;
- 1.10 begin to develop a personal stock of useful criteria for evaluating the ideas, procedures, and alternatives communicated to him by various means.

Listen 2 *listen with sensitivity, understanding, and discrimination;*

2.1 develop the powers of attention and concentration upon which successful listening depends;

2.2 become increasingly aware of *how* something is said, as well as *what* is being said;

2.3 develop sensitivity to sound, becoming constantly and critically aware of the nuances of rational speech, expressive speech, music, and other sounds;

2.4 develop greater sensitivity to, and appreciation of, the viewpoint of others;

2.5 become increasingly aware of the relationship between listening and responding, through such activities as debate, dramatic dialogue, and discussions of all kinds;

2.6 relate this awareness and discrimination to the media he uses for instructional or recreational purposes.

Speak 3 *articulate ideas, thoughts, and feelings with confidence and clarity;*

3.1 develop a growing competence in speech through such activities as discussion, debate, improvisation, panel discussion, role-playing, drama, and formal speaking;

3.2 become increasingly aware of the importance of tonal aspects of speech;

3.3 develop a growing appreciation of the relationship between speech and audience, and become increasingly adept at adapting speech to a particular audience;

3.4 develop the ability to understand, empathize with, or paraphrase another person's point of view;

3.5 grow in general awareness of the sociological aspects of speech.

Read 4 *acquire the interests and attitudes of a maturing reader;*

4.1 develop sufficient confidence to actively participate in a variety of reading tasks;

4.2 continue to develop an understanding and enjoyment of many varieties of written language;

4.3 develop personal reading interests and tastes.

Read 5 *extend and refine his use of reading/reasoning/language processes;*

5.1 read a variety of materials with fluency and efficiency;

5.2 focus attention on meaning;

5.3 set appropriate purposes for reading;

5.4 think as he reads, e.g., interpret, form mental images, discern cause and effect, main idea and detail, sequence, etc.;

5.5 obtain and use information proficiently, checking it for bias, relevance, and accuracy;

5.6 follow increasingly complex syntax and organizational patterns with fluency.

Read 6 *extend and consolidate vocabulary and word skills outlined for the Junior Division in "The Formative Years;"*

6.1 recognize on sight most words appropriate to his level;

6.2 use reference works such as the dictionary, and/or encyclopedias to unlock (read and understand) new words;

6.3 demonstrate a precise understanding of the denotation, as well as interest in the connotations, of words encountered in reading;

6.4 use a thesaurus appropriately.

Read 7 *develop control over the rate at which he reads;*

7.1 read at speeds that are adequate for comprehension and appropriate to his purpose and the type of material being read.

Write 8 *use writing skills commensurate with his physical, intellectual, and emotional maturity;*

8.1 demonstrate an expanding vocabulary, increased proficiency in spelling and punctuation, and precision in language usage;

8.2 demonstrate in his writing an increasing competence in the use of the conventions of standard written English;

8.3 acquire a deeper understanding of both the denotative and connotative function of words and apply this growing understanding in his writing;

8.4 develop an increasing sensitivity to the colour and vigour that can be achieved through the use of figurative language;

8.5 develop the skills of accurate observation and reporting;

8.6 develop an appreciation of personal observations, experiences, ideas, and feelings as potential resources for writing;

8.7 write about these experiences, ideas, and feelings with increasing clarity, logic, and sensitivity;

8.8 experience the joy of creativity;

8.9 demonstrate a growing proficiency in collecting, organizing, and presenting information in a coherent and appropriate form;

8.10 gain, through practice, advice, and encouragement, a growing competence in various forms of writing, both functional and creative, such as diaries, journals, letters; expository, narrative, or descriptive paragraphs; scripts, poems, or stories;

8.11 develop the ability to vary style and language level (register) to suit a variety of purposes;

8.12 perform with increasing precision and clarity such school language tasks as taking and making notes, writing reports, and answering examination questions;

8.13 become aware of the usefulness, for reference purposes, of books on English usage;

8.14 recognize the importance of legible handwriting in a presentation; develop a legible form of handwriting commensurate with his psychomotor skills.

Write 9 *recognize and appreciate models of writing;*

9.1 infer principles of language structure and usage from personal writing and literary models;

9.2 develop skill in adapting language to a specific purpose and audience so that the writing may achieve maximum impact;

9.3 understand some of the forces (such as the media) that work for or against change in English usage.

Write 10 *recognize and appreciate the function of review, revision, and assessment in the process of improving written work;*

10.1 gain, through editing, increasing competence in determining the voice, the syntactic structures, and the writing styles most appropriate for his purposes;

10.2 assess, through interaction with his teachers and peers, the organization and quality of written expression;

10.3 develop increasing sensitivity to the functions of language patterns which help him to classify, organize, summarize, interpret, synthesize, hypothesize, present, or assess written expression;

10.4 begin to acquire (having first recognized the functions) a simple descriptive terminology that will facilitate the giving and receiving of feedback concerning usage;

10.5 focus on ways of discovering and describing relationships, as opposed to the rote-memorization of definitions.

Value 11 *appreciate the role and value of language and literature in his own life;*

11.1 develop an appreciation of the role language plays in developing his perception and understanding of the world around him;

11.2 develop awareness of the relationship between thought and language;

11.3 gain, through language and literature, insight that will enable him to build a sense of identity, purpose, self-worth, and satisfaction;

11.4 grow in understanding of his own cultural heritage within the context of Canada's multicultural society;

11.5 understand persons belonging to other social and cultural groups as well as to his own;

11.6 recognize the riches that literature and language hold for personal growth and value them for their power to provide vicarious experience, to shed light on interpersonal relationships, and to extend and deepen personal awareness;

11.7 begin to see language and literature as a means whereby intellectual, moral, and social values can be explored;

11.8 conceive of learning as a lifelong experience in which language and literature, regardless of the medium through which they are presented (print, film, television) play a major part;

11.9 become aware of the many ways in which language and literature can enrich one's life, recognizing that the power of language may be used both *for* and *against* one, and that it is useful to remain linguistically fit.

STANDARDIZED TESTS IN ENGLISH

The most commonly-used standardized tests in English were collected from a number of sources readily available to Ontario educators. This collection of tests in English does not claim to be exhaustive but it includes all of the commonly used tests which have widely acknowledged standards of reliability and validity.

A total of 27 tests were collected and analysed and these have been categorized into four types of tests. English batteries, of which there are 10, have a number of subtests such as usage, punctuation, spelling, etc., and they measure a wide range of language skills. Reading tests, of which there are 13, focus specifically on the skills of reading but even in these specific domain tests there are subtests related to specific reading skills (e.g., paragraph reading, sentence reading, and comprehension). Criterion-referenced tests represent the third type and two of these are analysed. Each criterion-referenced test is actually a large number of language objectives and the analysis is very complex. Other English tests constitute the fourth type and there were two tests which stood apart from the rest, a test in literature and a test in vocabulary.

Here is a list of the English tests analysed in this study.

Lists of Tests in English

English Batteries

American School Achievement Tests--Advanced
Canadian Tests of Basic Skills
Content Evaluation Series
Cooperative English Tests
Iowa Tests of Educational Development
Metropolitan Achievement Tests--Advanced
SRA Assessment Survey
Sequential Tests of Educational Progress--Series II
Stanford Achievement Test-Advanced
Stanford Test of Academic Skills--Levels I and II

Reading

Davis Reading Test
Durrell Listening-Reading Series--Advanced
Gates-MacGinitie Reading Tests--Survey E
Gilmore Oral Reading Test
Gray Oral Reading Tests
Iowa Silent Reading Tests--Level I
Nelson Reading Skills Test
Nelson-Denny Reading Test
Pressey Diagnostic Reading Tests
SRA Reading Record
Stanford Achievement Test--High School Reading
Stanford Diagnostic Reading Test--Level III
Traxler Silent Reading Test

Criterion-Referenced Tests

SRA Mastery
Score--Criterion Referenced Testing Service

Other English Tests

Cooperative Literature Tests
Wide Range Vocabulary Tests

AMERICAN SCHOOL ACHIEVEMENT TESTS

Description

The Advanced Battery of the American School Achievement Tests, for grades 7, 8, and 9, is designed to measure pupil achievement as early as the beginning of the seventh year of school and as late as the end of the ninth year of school. For the most part, this battery has been confined to a measurement of the tools of learning in the language arts and arithmetic.

Results for these tests may serve a four-fold purpose: (1) to measure pupil progress, (2) to assist in the individualization of instruction, (3) to furnish data for developmental programs in the language arts, and (4) to diagnose the pupil's knowledge of specific computations and his problem-solving ability.

Part I of the battery of tests is a Reading test having two sections. The Sentence and Word Meaning subtest consists of 40 items of increasing difficulty which measure the pupil's reading vocabulary by the recognition of the meaning of words as parts of sentences. The words tested cover a wide range of vocabulary common to children at the junior high school levels. The Paragraph Meaning subtest consists of 14 paragraphs, each one of which is followed by two or more questions, making a total of 48 items in all. Paragraphs used have been selected for their interest value to pupils at the required age levels. The Language subtest consists of five parts--Correct Usage, Punctuation, Capitalization, Sentence Recognition, and Grammar.

The Spelling test in Part III of the battery consists of 50 words commonly taught in the seventh, eighth, and ninth grades.

Summary of Item Analysis

The subtests of this battery touch on all aspects of the English curriculum except Listening and Speaking. Part I, Reading, has two sections. The first section, Sentence and Word Meaning, is a vocabulary test with 40 items, all of which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 40 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and fluency/efficiency (5.1). The second section of the Reading test is a comprehension test entitled Paragraph Meaning. Its 48 items relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5). They relate directly also to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 48 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3) and in deepening awareness (11.6). Part III is made up of two sections: Language (which includes Correct Usage, Punctuation, Capitalization, Sentence Recognition, and Grammar) and Spelling. Correct Usage has 20 items which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2), and in editorial skills (10.1, 10.4). Indirectly, the 20 items relate to inferring language principles from models (9.1). Punctuation has 10 items which relate directly to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in handling information (8.9), and indirectly to the Writing objectives of performing school writing tasks (8.12) and editing (10.1). Capitalization has 10 items which test proficiency in the basic skills (Writing 8.1). Sentence

Recognition and Grammar have 10 and 23 items respectively, and these 33 items relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2), in handling information (8.9), performing school writing tasks (8.12), and in editorial skills (10.1, 10.4, 10.5). Indirectly, the 33 items relate to the Writing objective of inferring language principles from models (9.1). The Spetling subtest has 50 items which relate directly to the Writing objective of proficiency in spelling (8.1).

Table 1 American School Achievement Tests

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Vocabulary	40/	40/																			/40	/40		/40	40/					40/		40/	
Comprehension	48/	48/	48/		48/																/48	/48		48/	48/		48/		48/	48/		/48	
Punctuation																																	
Capitalization																																	
Sentences	10/	10/																															
Usage	20/	20/																															
Grammar	23/	23/																															

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Vocabulary																																
Comprehension	48/																							/48		/48			/48			
Punctuation		10/	10/							10/			/10						/10													
Capitalization		10/																														
Sentences		10/	10/							10/			10/			/10			10/			10/	10/									
Usage		20/	20/													/20			20/			20/										
Grammar		23/	23/							23/			23/			/23			23/			23/	23/									
Spelling		59/																														

TABLE 1A

Test Analysis: Specific Items Related to Objectives
American School Achievement Tests
Advanced Battery--(Grades 7, 8, and 9)

Objective	Subtest	Item
	Vocabulary	
1.1		1-40
1.2		1-40
4.1		(1-40)
4.2		(1-40)
5.1		(1-40)
5.2		1-40
6.1		1-40
6.3		1-40
	Comprehension	
1.1		1-48
1.2		1-48
1.3		1-48
1.5		1-48
4.1		(1-48)
4.2		(1-48)
5.1		1-48
5.2		1-48
5.4		1-48
5.6		1-48
6.1		1-48
6.3		(1-48)
7.1		1-48
11.1		(1-48)
11.3		(1-48
11.6		(1-48)
	Punctuation	
8.1		21-30
8.2		21-30
8.9		21-30
8.12		(21-30)
10.1		(21-30)

Objective	Subtest	Item
	Capitalization	
3.1		31-40
	Sentence Recognition	
1.1		41-50
1.2		41-50
8.1		41-50
8.2		41-50
8.9		41-50
8.12		41-50
9.1		(41-50)
10.1		41-50
10.4		41-50
10.5		41-50
	Usage	
1.1		1-20
1.2		1-20
8.1		1-20
8.2		1-20
9.1		(1-20)
10.1		1-20
10.4		1-20
	Grammar	
1.1		51-73
1.2		51-73
8.1		51-73
8.2		51-73
8.9		51-73
8.12		51-73
9.1		(51-73)
10.1		51-73
10.4		51-73
10.5		51-73
	Spelling	
8.1		1-50

CANADIAN TESTS OF BASIC SKILLS

Description

Levels 13 and 14 of these tests apply to grades 7 and 8.

The purpose of measurement is to provide information which can be used in improving instruction. The Canadian Tests of Basic Skills provide for the measurement of skills involved in reading, language, work-study, and mathematics. The skills represented in the tests are crucial in the educational development of pupils and largely determine the extent to which they can profit from later instruction.

In the typical classroom in the middle grades, the range of skills development is approximately six to eight years. Even in the most advantaged or disadvantaged district the range is often this great. This means that no single test can be equally well suited to the entire range of achievement. However, the Canadian Tests of Basic Skills is a continuous battery of tests, covering the range of achievement development in the elementary school.

Summary of Item Analysis

The Vocabulary, Reading Comprehension, and Language Skills subtests of this battery touch on all areas of the English curriculum except Listening and Speaking. The Vocabulary subtest has 57 items, all of which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 57 items relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and fluency (5.1). The Reading Comprehension subtest has 98 items, all of which relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/ logical thinking (1.5), and to the Reading objectives of fluency/ efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 98 items relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language (11.1, 11.3, 11.6). The Language Skills subtest is in four parts. The first two parts, Spelling and Capitalization, have 62 and 54 items respectively. These 116 items directly measure proficiency in spelling and punctuation (Writing objective 8.1). The third part, Punctuation, has 54 items which relate directly not only to the Writing objective 8.1, but to 8.2 and 8.9 which also have to do with basic skills in writing. Indirectly, these 54 items relate to the Writing objectives of performing school writing tasks (8.12) and developing editorial skills (10.1). The fourth part, Usage, has 43 items which relate directly to the Thinking objectives of observation/ recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of developing basic skills (8.1, 8.2) and editorial skills (10.1, 10.4, 10.5). Indirectly, these 43 items relate to inferring language usage principles from models (9.1).

Table 2 Canadian Tests of Basic Skills

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Vocabulary	57/	57/																			/57	/57		/57	57/					57/		57/	
Comprehension	98/	98/	98/		98/																/98	/98		98/	98/		98/		98/	98/		/98	
Spelling																																	
Capitalization																																	
Punctuation																																	
Usage	43/	43/																															

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	·9
Comprehension	98/																							/98		/98			/98			
Spelling		62/																														
Capitalization		54/																														
Punctuation		54/	54/							54/			/54						/54													
Usage		43/	43/													/43			43/			43/	43/									

TABLE 2A

Test Analysis: Specific Items Related to Objectives

Canadian Tests of Basic Skills

Form 3 Levels 13 and 14

Objective	Subtest	Item
	Vocabulary	
1.1		58-114
1.2		58-114
4.1		(58-114)
4.2		(58-114)
5.1		(58-114)
5.2		58-114
6.1		58-114
6.3		58-114
	Reading Comprehension	
1.1		80-178
1.2		80-178
1.3		80-178
1.5		80-178
4.1		(80-178)
4.2		(80-178)
5.1		80-178
5.2		80-178
5.4		80-178
5.6		80-178
6.1		80-178
6.3		(80-178)
7.1		80-178
11.1		(80-178)
11.3		(80-178)
11.6		(80-178)

Objective	Subtest	Item
	Language Skills Spelling	
8.1		53-114
	Capitalization	
8.1		49-102
	Punctuation	
8.1		49-102
8.2		49-102
8.9		49-102
8.12		(49-102)
10.1		(49-102)
	Usage	
1.1		44- 86
1.2		44- 86
8.1		44- 86
8.2		44- 86
9.1		(44- 86)
10.1		44- 86
10.4		44- 86
10.5		44- 86

17

CONTENT EVALUATION SERIES--LANGUAGE ARTS TESTS

Description

The Language Ability Test seeks to assess (1) the student's grasp of important principles underlying the construction of the English sentence and (2) the student's ability to use sentence elements in standard sentence patterns. To realize those objectives, the test concentrates on the distinctive areas which research has shown to be of greatest importance in language development--namely, sentence structure, word form and function, mechanics, and diction.

The Composition Test, which complements the Language Ability Test, is essentially an instrument for gauging progress towards writing proficiency. The primary aim of the test is to assess the ability of the student to manipulate his language effectively--that is, to express himself correctly, clearly, and forcefully in a series of interrelated, meaningful sentences organized to bring out a central point.

The Literature Test seeks (1) to assess the student's ability to identify the principal types of literature and to differentiate among them and (2) to gauge the breadth and the depth of the student's feeling for literature. To accomplish the second major objective, the test seeks to measure the student's ability to (a) respond to his literary experiences and participate imaginatively in them, (b) perceive the overall purpose, organization, and meaning of the literature he reads, and (c) discern and appreciate those distinctive qualities of good literature that give significance to his literary experiences.

Summary of Item Analysis

There are three Language Arts tests in this series: Language Ability, Composition, and Literature. The Language Ability test has 58 items which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in editorial skills (10.1, 10.4, 10.5), in handling information (8.9), and in performing school writing tasks (8.12). Indirectly, the 58 items relate to the Writing objective of inferring language usage principles from models (9.1). The Composition test has 60 items, all of which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in editorial skills (10.1, 10.4, 10.5). Indirectly, the 60 items relate to the Writing objective of inferring language usage principles from models (9.1). The literature test has 45 items which relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 45 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3) and in deepening awareness (11.6).

Table 3 Content Evaluation Series--Language Arts Tests

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Language	58/	58/																															
Composition	60/	60/																															
Literature	45/	45/	45/		45/																/45	/45		45/	45/		45/		45/	45/		/45	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Language		58/	58/							58/			58/			/58			58/			58/	58/									
Composition		60/	60/													/60			60/			60/	60/									
Literature	45/																							/45		/45			/45			

TABLE 3A
Test Analysis: Specific Items Related to Objectives
Content Evaluation Series--Language Arts Tests

Objective	Subtest	Item
	Language Ability	
1.1		1-58
1.2		1-58
8.1		1-58
8.2		1-58
8.9		1-58
8.12		1-58
9.1		(1-58)
10.1		1-58
10.4		1-58
10.5		1-58
	Composition	
1.1		1-60
1.2		1-60
8.1		1-60
8.2		1-60
9.1		(1-60)
10.1		1-60
10.4		1-60
10.5		1-60
	Literature	
1.1		1-45
1.2		1-45
1.3		1-45
1.5		1-45
4.1		(1-45)
4.2		(1-45)
5.1		1-45
5.2		1-45
5.4		1-45
5.6		1-45
6.1		1-45
6.3		(1-45)
7.1		1-45
11.1		(1-45)
11.3		(1-45)
11.6		(1-45)

COOPERATIVE ENGLISH TESTS

Description

There are two levels of Cooperative Reading Comprehension and Cooperative English Expression, and three alternate tests at each level. Tests 2A, 2B, and 2C are for grades 9, 10, 11, and 12.

It should be stressed that the tests at a given level are designed to be appropriate for typical students in the grade range indicated. Particularly advanced or retarded students may be given the next higher or lower level. Using an appropriate form of test for each student is facilitated by the facts that (a) no grade designations appear on test booklets or answer sheets, (b) the timing and instructions for administering the tests are the same for all forms, and (c) scores for all forms of each test are on a common scale.

Test booklets for Reading Comprehension and English Expression are published in separate and single-booklet editions. The single-booklet edition consists of one Reading Comprehension test followed by one English Expression test, both of the same level and form; general directions precede each test.

Summary of Item Analysis

The two subtests contain items which relate to Thinking, Reading, Writing, and, indirectly, to some Values objectives, but none which relate to Listening or Speaking objectives. The Reading Comprehension subtest is in two parts. Part I is a Vocabulary test, and its 60 items relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3), and indirectly to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and fluency/efficiency (5.1). Part II is a Reading test with 60 items. These items relate directly to the Thinking objectives of observation (1.1) and comprehension (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). The 60 items relate indirectly to the Reading attitude objectives (4.1, 4.2), and to understanding of denotation (6.3), and to the Values objectives of appreciating the role of language (11.1, 11.3, 11.6). The English Expression subtest is also in two parts. Part I, Effectiveness, has 30 items which directly relate to the Thinking objectives of observation/recall (1.1), and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3), and indirectly to the Reading objectives of confidence (4.1), understanding (4.2), and fluency/efficiency (5.1). Part II is entitled Mechanics, and its 60 items relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2), and in editorial skills (10.1, 10.4, 10.5), in handling information (8.9), and in performing school writing tasks (8.12). Indirectly the 60 items relate to the Writing objective of inferring principles of language structure and usage from models (9.1).

Table 4 Cooperative English Tests

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Vocabulary	60/	60/																			/60	/60		/60	60/					60/		60/	
Reading	60/	60/	60/		60/																/60	/60		60/	60/		60/		60/	60/		/60	
Effectiveness	30/	30/																			/30	/30		/30	30/					30/		30/	
Mechanics	60/	60/																															

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Reading	60/																							/60		/60			/60			
Mechanics		60/	60/							60/			60/			/60			60/			60/	60/									

TABLE 4A

Test Analysis: Specific Items Related to Objectives

Cooperative English Tests

Objective	Subtest	Item
	Reading Comprehension	
	Part I: Vocabulary	
1.1		1-60
1.2		1-60
4.1		(1-60)
4.2		(1-60)
5.1		(1-60)
5.2		1-60
6.1		1-60
6.3		1-60
	Part II: Reading	
1.1		1-60
1.2		1-60
1.3		1-60
1.5		1-60
4.1		(1-60)
4.2		(1-60)
5.1		1-60
5.2		1-60
5.4		1-60
5.6		1-60
6.1		1-60
6.3		(1-60)
7.1		1-60
11.1		(1-60)
11.3		(1-60)
11.6		(1-60)

Objective	Subtest	Item
	English Expression Part I: Effectiveness	
1.1		1-30
1.2		1-30
4.1		(1-30)
4.2		(1-30)
5.1		(1-30)
5.2		1-30
6.1		1-30
6.3		1-30
	Part II: Mechanics	
1.1		1-60
1.2		1-60
8.1		1-60
8.2		1-60
8.9		1-60
8.12		1-60
9.1		(1-60)
10.1		1-60
10.4		1-60
10.5		1-60

IOWA TESTS OF EDUCATIONAL DEVELOPMENT--SRA ASSESSMENT SURVEY

Description

The SRA Assessment Survey edition of the Iowa Tests of Educational Development is an entirely new version of the ITED. Although the content is completely new and the format considerably shortened, it retains the substance of previous editions.

The core of the ITED/Assessment consists of Reading, with subtests in Comprehension and Vocabulary; Language Arts, with subtests in Usage and Spelling; and Mathematics.

The student is required to show his ability to express himself clearly and correctly, to analyse critically materials of the type that educated adults encounter in their reading.

Summary of Item Analysis

The Reading, Language Arts, and Use of Sources subtests contain items that measure objectives in Thinking, Reading, Writing, and (indirectly) Values, but none that test Listening and Speaking skills. There are 54 items in the Reading-Comprehension subtest. These items deal directly with the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and with the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 54 items of this subtest measure the Reading objectives of confidence (4.1), understanding/enjoyment (4.2) and understanding of denotation (6.3), and the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). In the Reading-Vocabulary subtest, there are 40 items which relate directly not only to Reading (Vocabulary) objectives 6.1 and 6.3 but also to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and the Reading objective of focus on meaning (5.2). Indirectly, the items touch on the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and fluency/efficiency (5.1). The Language Arts-Usage subtest has 48 items directly related to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in editorial skills (10.1, 10.4, 10.5). Indirectly, these 48 items measure the Writing objective of inferring language usage principles from models (9.1). The 40 items of the Language Arts-Spelling subtest are all directly related to Writing objective 8.1: to demonstrate proficiency in spelling. The Use of Sources subtest has 46 items which directly relate to such Thinking objectives as gathering, assessing, and synthesizing information (1.4, 1.6, 1.7), to the Reading objectives of handling information (5.5) and using reference works (6.2, 6.4), and the Writing objective of accurate reporting (8.5). Indirectly, the 46 items of the subtest touch on the Reading objective of fluency/efficiency (5.1).

Table 5 Iowa Tests of Educational Development

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Comprehension	54/	54/	54/		54/																/54	/54		54/	54/		54/		54/	54/		/54	
Vocabulary	40/	40/																			/40	/40		/40	40/					40/		40/	
Usage	48/	48/																															
Spelling																																	
Use of Sources				46/		46/	46/																	/46				46/			46/		46/

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Comprehension	54/																							/54		/54			/54			
Vocabulary																																
Usage		48/	48/													/48			48/			48/	48/									
Spelling		40/																														
Use of Sources						46/																										

TABLE 5A

Test Analysis: Specific Items Related to Objectives

Iowa Tests of Educational Development

SRA Assessment Survey

(Grades 9-12)

Objective	Subtest	Item
	Reading Comprehension	
1.1		1-54
1.2		1-54
1.3		1-54
1.5		1-54
4.1		(1-54)
4.2		(1-54)
5.1		1-54
5.2		1-54
5.4		1-54
5.6		1-54
6.1		1-54
6.3		(1-54)
7.1		1-54
11.1		(1-54)
11.3		(1-54)
11.6		(1-54)
	Vocabulary	
1.1		1-40
1.2		1-40
4.1		(1-40)
4.2		(1-40)
5.1		(1-40)
5.2		1-40
6.1		1-40
6.3		1-40

Objective	Subtest	Item
	Language Arts	
	Usage	
1.1		1-48
1.2		1-48
8.1		1-48
8.2		1-48
9.1		(1-48)
10.1		1-48
10.4		1-48
10.5		1-48
	Spelling	
8.1		1-40
	Use of Sources	
1.4		1-46
1.6		1-46
1.7		1-46
5.1		(1-46)
5.5		1-46
6.2		1-46
6.4		1-46
8.5		1-46

METROPOLITAN ACHIEVEMENT TESTS--ADVANCED BATTERY

Description

The Metropolitan Achievement Tests are a series of measures designed to tell teachers and administrators how much pupils have learned in important content and skill areas of the school curriculum.

The test contents are based on careful and extensive analyses of contemporary textbooks, syllabuses, and other curricular sources and consist of the following subtests:

Word Knowledge--50 items which measure the extent of pupils' reading vocabulary. Items ask for synonyms, antonyms, or classification of words. Content covers words used for general information, social studies, humanities, science, and mathematics, without calling for knowledge of technical terms.

Reading--45 items which measure pupils' ability to comprehend written material. Pupils read a paragraph, then answer questions about it. Items call for comprehending literally stated material, drawing inferences from a passage, identifying main ideas, and determining word meanings from context.

Language, Part A: Study Skills--34 items which measure pupils' skill in using common sources of information such as dictionary, encyclopedia, index, etc. Part B: Parts of Speech--12 items which measure pupils' understanding of word functions as illustrated by their ability to identify the type of word needed to complete a sentence. Part C: Punctuation, Capitalization, and Usage--24 items which measure pupils' knowledge of basic conventions in standard written English.

Spelling--50 items which measure pupils' ability to recognize incorrectly spelled words. Items cover common types of misspellings including vowel confusions, doubling consonants, etc.

Summary of Item Analysis

The Word Knowledge, Reading, Language, and Spelling subtests of this battery touch on all areas of the English curriculum except Listening and Speaking. The 50 items of the Word Knowledge subtest are directly related to the Thinking objectives of observation/recall (1.1), and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1) and understanding of denotation (6.3). The 50 items are also related indirectly to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and fluency/efficiency (5.1). The Reading (Comprehension) subtest contains 45 items, all of which are directly related to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5). These 45 items are also directly related to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 45 items relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). The language subtest has three parts. Part A tests study skills, and its 34 items relate directly to the Thinking objectives of gathering, assessing, and synthesizing information (1.4, 1.6, 1.7), the Reading objectives of obtaining and using information (5.5) by using reference works (6.2, 6.4), and the Writing objective of accurate observation and reporting (8.5). Indirectly, the 34 items measure fluency/efficiency in Reading (5.1). Part B concentrates on parts of speech, and its 12 items directly measure achievement of the Thinking objectives of observation/recall (1.1), and comprehension/analysis (1.2), and the Writing objectives of increasing proficiency (8.1) and competence (8.2), and editorial skills (10.1, 10.4, 10.5). Indirectly, these 12 items relate to inference of language usage principles from models (9.1). Part C, Punctuation, has 44 items which relate directly to the Thinking objectives of observation/recall (1.1), and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2, 8.9) and in editorial skills (10.1, 10.4, 10.5), and indirectly to Writing objectives such as handling examination questions (8.12), and inferring language usage principles from models (9.1). The Spelling substests 50 items relate directly to the Writing objective of increasing proficiency and precision (8.1)

Table 6 Metropolitan Achievement Tests

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING					
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6
Word Knowledge	50/	50/														
Comprehension	45/	45/	45/		45/											
Study Skills				34/		34/	34/									
Parts of Speech	12/	12/														
Punctuation	44/	44/														

NAME OF SUBTEST	SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Word Knowledge					/50	/50		/50	50/					50/		50/	
Comprehension					/45	/45		45/	45/		45/		45/	45/		/45	
Study Skills								/34				34/			34/		34/
Parts of Speech																	
Punctuation																	

	READING (Rate)	WRITING (Skills)													
	7.1	8.1	.2	3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14
Word Knowledge															
Comprehension	45/														
Study Skills						34/									
Parts of Speech		12/	12/												
Punctuation		44/	44/							44/			/44		
Spelling		50/													

	WRITING (Models)			WRITING (Revising)					VALUES								
	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Word Knowledge																	
Comprehension									/45		/45			/45			
Study Skills																	
Parts of Speech	/12			12/			12/	12/									
Punctuation	/44			44/			44/	44/									
Spelling																	

TABLE 6A

Test Analysis: Specific Items Related to Objectives

Metropolitan Achievement Tests

Advanced Battery--Grades 7.0-9.5

Objective	Subtest	Item
	Word Knowledge	
1.1		1-50
1.2		1-50
4.1		(1-50)
4.2		(1-50)
5.1		(1-50)
5.2		1-50
6.1		1-50
6.3		1-50
	Reading (Comprehension)	
1.1		1-45
1.2		1-45
1.3		1-45
1.5		1-45
4.1		(1-45)
4.2		(1-45)
5.1		1-45
5.2		1-45
5.4		1-45
5.6		1-45
6.1		1-45
6.3		(1-45)
7.1		1-45
11.1		(1-45)
11.3		(1-45)
11.6		(1-45)

Objective	Subtest	Item
	Language	
	Part A: Study Skills	
1.4		1-34
1.6		1-34
1.7		1-34
5.1		(1-34)
5.5		1-34
6.2		1-34
6.4		1-34
8.5		1-34
	Part B: Parts of Speech	
1.1		35-46
1.2		35-46
8.1		35-46
8.2		35-46
9.1		(35-46)
10.1		35-46
10.4		35-46
10.5		35-46
	Part C: Punctuation, Capitalization,Usage	
1.1		47-90
1.2		47-90
8.1		47-90
8.2		47-90
8.9		47-90
8.12		(47-90)
9.1		(47-90)
10.1		47-90
10.4		47-90
10.5		47-90
	Spelling	
8.1		1-50

SRA ASSESSMENT SURVEY--ACHIEVEMENT SERIES

Description

The Achievement Series (ACH) measures the educational development of students in grades 1 through 9 in basic curriculum areas. When these tests are followed by the Iowa Tests of Educational Development at the high school level, the SRA Assessment Survey provides a program of continuous and comprehensive measurement for grades 1 through 12.

The ACH multilevel edition consists of three separate but overlapping tests of graduated difficulty designed for use in grades 4 through 9.

Summary of Item Analysis

There are five English subtests in this battery: Reading (Comprehension), Vocabulary, Language Arts, Spelling, and Use of Sources. These subtests relate to Thinking, Reading, Writing, and Values objectives, but not to Listening and Speaking. The 60 items of the Reading (Comprehension) subtest relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading, (5.4) increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 60 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6).

The Vocabulary subtest has 30 items, all of which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 30 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and fluency/efficiency (5.1). The 70 items of the Language Arts subtest relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in basic skills (8.1, 8.2) and in editorial skills (10.1, 10.4, 10.5). They relate indirectly to the Writing objective of inferring principles of language structure and usage from models (9.1). The Spelling subtest has 40 items which directly measure Writing objective 8.1: to demonstrate proficiency in spelling. In the Use of Sources subtest, there are 40 items which directly relate to the Thinking objectives of gathering, assessing, and synthesizing evidence (1.4, 1.6, 1.7), to the Reading objectives of handling information (5.5), word recognition (6.1), and understanding of denotation (6.3), and to the Writing objective of developing skills of accurate observation and reporting (8.5). Indirectly, the 40 items relate to the Reading objective of fluency/efficiency (5.1).

Table 7 SRA Assessment Survey--Achievement Series

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Comprehension	60/	60/	60/		60/																/60	/60		60/	60/		60/		60/	60/		/60	
Vocabulary	30/	30/																			/30	/30		/30	30/					30/		30/	
Language Arts	70/	70/																															
Spelling																																	
Use of Sources				40/		40/	40/																	/40				40/			40/		40/

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Comprehension	60/																							/60		/60			/60			
Vocabulary																																
Language Arts		70/	70/													/70			70/			70/	70/									
Spelling		40/																														
Use of Sources						40/																										

TABLE 7A

Test Analysis: Specific Items Related to Objectives

SRA Assessment Survey--Achievement Series

Objective	Subtest	Item
	Comprehension	
1.1		1-60
1.2		1-60
1.3		1-60
1.5		1-60
4.1		(1-60)
4.2		(1-60)
5.1		1-60
5.2		1-60
5.4		1-60
5.6		1-60
6.1		1-60
6.3		(1-60)
7.1		1-60
11.1		(1-60)
11.3		(1-60)
11.6		(1-60)
	Vocabulary	
1.1		1-30
1.2		1-30
4.1		(1-30)
4.2		(1-30)
5.1		(1-30)
5.2		1-30
6.1		1-30
6.3		1-30

Objective	Subtest	Item
	Language Arts	
1.1		1-70
1.2		1-70
8.1		1-70
8.2		1-70
9.1		(1-70)
10.1		1-70
10.4		1-70
10.5		1-70
	Spelling	
8.1		1-40
	Use of Sources	
1.4		1-40
1.6		1-40
1.7		1-40
5.1		(1-40)
5.5		1-40
6.2		1-40
6.4		1-40
8.5		1-40

SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS (STEP)--SERIES II

Description

The Sequential Tests of Educational Progress (STEP) Series II is a battery of achievement tests designed to evaluate student progress toward fulfilling the broad, general goals of education in academic areas. In contrast to the limited focus of end-of-course achievement tests, STEP Series II concentrates on the measurement of those skills and understandings that should be part of the repertoire of every well-informed citizen.

Forms 3A and 3B are for junior high school students, and forms 2A and 2B for high school students.

Summary of Item Analysis

The three English subtests considered here touch on all areas of the English curriculum except Listening and Speaking. The Reading subtest has two sections. The Word Meaning section has 30 items which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 30 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2) and fluency/efficiency (5.1). The Comprehension section has 30 items which relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/

efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 30 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3). The Mechanics of Writing subtest has two sections: Spelling and Punctuation/Capitalization. The 45 spelling items relate directly to the Writing objective of proficiency in spelling (8.1). The 45 Punctuation items relate directly to the Writing objectives of proficiency in the basic skills (8.1, 8.2), and in handling information (8.9), and indirectly to performing school writing tasks (8.12) and editing (10.1). The English Expression subtest has two sections, both of which test usage. The 65 items relate directly to the Thinking objectives of observation recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in editorial skills (10.1, 10.4, 10.5). Indirectly, the 65 items relate to the Writing objective of inferring language usage principles from models (9.1).

Table 8 Sequential Tests of Educational Progress (STEP)--Series II

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Word Meaning	30/	30/																			/30	/30		/30	30/					30/		30/	
Comprehension	30/	30/	30/		30/																/30	/30		30/	30/		30/		30/	30/		/30	
Spelling																																	
Punctuation																																	
Usage - I	40/	40/																															
Usage - II	25/	25/																															

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Word Meaning																																
Comprehension	30/																							/30		/30			/30			
Spelling		45/																														
Punctuation		45/	45/							45/			/45						/45													
Usage - I		40/	40/													/40			40/			40/	40/									
Usage - II		25/	25/													/25			25/			25/	25/									

TABLE 8A

Test Analysis: Specific Items Related to Objectives

Sequential Tests of Educational Progress (STEP)
Series II

Forms 2A and 3A

Objective	Subtest	Item
	Reading	
	Part I: (Word Meaning)	
1.1		1-30
1.2		1-30
4.1		(1-30)
4.2		(1-30)
5.1		(1-30)
5.2		1-30
6.1		1-30
6.3		1-30
	Part II: (Comprehension)	
1.1		1-30
1.2		1-30
1.3		1-30
1.5		1-30
4.1		(1-30)
4.2		(1-30)
5.1		1-30
5.2		1-30
5.4		1-30
5.6		1-30
6.1		1-30
6.3		(1-30)
7.1		1-30
11.1		(1-30)
11.3		(1-30)
11.6		(1-30)

Objective	Subtest	Item
	Mechanics of Writing	
	Part I: (Spelling)	
8.1		1-45
	Part II: (Capitalization and Punctuation)	
8.1		1-45
8.2		1-45
8.9		1-45
8.12		(1-45)
10.1		(1-45)
	English Expression	
	Part I: (Usage)	
1.1		1-40
1.2		1-40
8.1		1-40
8.2		1-40
9.1		(1-40)
10.1		1-40
10.4		1-40
10.5		1-40
	Part II: (Usage)	
1.1		1-25
1.2		1-25
8.1		1-25
8.2		1-25
9.1		(1-25)
10.1		1-25
10.4		1-25
10.5		1-25

STANFORD ACHIEVEMENT TEST--ADVANCED BATTERY

Description

The Stanford Achievement Test is a series of comprehensive achievement tests developed to provide measurement and assessment of learning at different levels of the educational process.

The Advanced Level complete battery is primarily designed for use from the beginning of grade 7 to the middle of grade 9.

The new 1973 Stanford Achievement Test was designed to provide educators with test batteries which will measure pupil achievement in all major areas of the current curriculum, utilizing the most recent developments in test technology. The thrust of the test is to assess the current status of the children and to provide usable instructional suggestions.

Major changes have taken place in all areas of the curriculum in the '60s and '70s, necessitating a complete revision of test objectives and item content to provide an achievement test for today's schools. In the language arts areas of reading and listening, the content has been chosen to appeal to children from urban, suburban, rural, and inner-city schools. In Reading Comprehension, the paragraphs selected are those that appeal to a broad spectrum of pupils.

Both the Teacher's Directions for Administering and the Norms Booklet contain all information necessary for the teacher to understand the authors' rationale for the tests, to be able to administer the tests easily and efficiently, to understand the research for establishing norms, and to translate raw scores into a variety of interpreted scores.

Every item included in the tests in the series was carefully chosen so as to be relatively free of bias from the standpoint of race, religion, sex, and ethnic background, while at the same time reflecting the cultural diversity of children.

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Summary of Item Analysis

This battery of tests covers all areas of the English curriculum except Listening, Speaking, and Creative Writing. The 50 items of the Vocabulary subtest relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), as well as to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the items relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), as well as fluency/efficiency (5.1). The 74 Comprehension questions touch directly on Thinking and Reading objectives, and indirectly on Reading (interests and attitudes) and Values objectives. A subtest of 60 items measures spelling skills (Writing objective 8.1). The Language subtest has 53 items relating directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to Writing objectives which deal with proficiency and competence in the use of language and conventions (8.1, 8.2), and with editorial skills (10.1, 10.4, 10.5). The 53 items relate indirectly to the inference of language usage principles from models (9.1). Twenty-six items in the Language subtest deal with the use of references, especially the dictionary, and cover such objectives as handling information (1.4, 1.6, 1.7, 5.5), using reference works (6.2, 6.4), and developing skills of accurate observation (8.5). Indirectly, these 26 items test the ability to read a variety of materials with fluency and efficiency (5.1).

Table 9 Stanford Achievement Test

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Vocabulary	50/	50/																			/50	/50		/50	50/					50/		50/	
Comprehension	74/	74/	74/		74/																/74	/74		74/	74/		74/		74/	74/		/74	
Spelling																																	
Usage	53/	53/																															
References				26/		26/	26/																	/26				26/			26/		26/

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Vocabulary																																
Comprehension	74/																							/74		/74			/74			
Spelling		60/																														
Usage		53/	53/													/53			53/			53/	53/									
References						26/																										

TABLE 9A

Test Analysis: Specific Items Related to Objectives

Stanford Achievement Test--Advanced Battery

Objectives	Subtest	Item
	Vocabulary	
1.1		1-50
1.2		1-50
4.1		(1-50)
4.2		(1-50)
5.1		(1-50)
5.2		1-50
6.1		1-50
6.3		1-50
	Reading Comprehension	
1.1		1-74
1.2		1-74
1.3		1-74
1.5		1-74
4.1		(1-74)
4.2		(1-74)
5.1		1-74
5.2		1-74
5.4		1-74
5.6		1-74
6.1		1-74
6.3		(1-74)
7.1		1-74
11.1		(1-74)
11.3		(1-74)
11.6		(1-74)
	Spelling	
8.1		1-60

Objective	Subtest	Item
	Language	
	Parts A and B: Usage and Punctuation	
1.1		1-53
1.2		1-53
8.1		1-53
8.2		1-53
9.1		(1-53)
10.1		1-53
10.4		1-53
10.5		1-53
	Part C: Use of Reference Materials	
1.4		54-79
1.6		54-79
1.7		54-79
5.1		(54-79)
5.5		54-79
6.2		54-79
6.4		54-79
8.5		54-79

STANFORD TEST OF ACADEMIC SKILLS

Description

There are three tests in each of the two levels of TASK. Level I is for grades 8, 9, and 10.

Reading: Part A of this test measures reading comprehension and Part B measures vocabulary. In Part A (items 1-42), the student is instructed to read a paragraph and then answer the questions which follow it. Items 43-51 require the student to read a paragraph in which several words are missing. The student must then choose from among four options the word or words that should be inserted in the paragraph to have it read correctly. Technically this may be thought of as a modified cloze technique. Part A tests the student's ability to comprehend what is explicit in the material, to judge what is implied, and to draw inferences with reference to other situations. In Part B, the vocabulary section, the student is given a word and instructed to match it with one of the five choices which is most closely related to the given word.

English: This test measures the student's knowledge and effective use of the English language. Part A deals with skills such as dictionary use, reference sources, and the nature and structure of language. In Part B the student is to determine for each underlined passage in a short narrative whether there is an error in capitalization, grammar, punctuation, or if there is no error present. Part C is a spelling test. Part D tests English expression. Part E presents a series of four-sentence paragraphs in which the logical sequence of the sentences in the paragraph has been jumbled. The student is to re-order the sentences so that the paragraph presents the idea properly.

Summary of Item Analysis

Items from the Reading and English subtests relate to Thinking, Reading, Writing, and (indirectly) Values objectives of the English curriculum, but not to Listening or Speaking. The Reading subtest is in two parts. Part A, Comprehension, has 51 items, all of which relate directly to the Thinking objectives of observation (1.1), comprehension (1.2), handling questions (1.3), and inference (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 51 items relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and understanding of denotation (6.3), as well as to the Values objectives of appreciating the role of language (11.1, 11.3, 11.6). Part B of the Reading test, Vocabulary, has 27 items, all of which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, these 27 items relate to the Reading attitude objectives (4.1, 4.2) and to fluency/efficiency (5.1). The English subtest has five parts. Part A deals with use of reference sources and with usage, and its 15 items relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), processing information (1.4, 1.6, 1.7). The 15 items relate directly also to the Reading objectives of handling information (5.5) and using reference works (6.2, 6.4), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2), reporting (8.5), and editorial skills (10.1, 10.4, 10.5). Indirectly, the 15 items relate to the Reading objective of fluency/efficiency (5.1), and to the Writing objective of inferring principles of language (9.1). The 21 items of Part B test knowledge of punctuation, capitalization, and grammar, and relate directly to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in handling information (8.9), and indirectly to the Writing objectives of performing school writing tasks (8.12), and editing (10.1). Part C has 15 spelling items, measuring Writing objective 8.1. Parts D and E test English expression and the 18 items relate directly to the Thinking objectives of observation/recall (1.1), and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in handling information (8.9), performing school writing tasks (8.12), inferring principles of language (9.1), and using editorial skills (10.1, 10.4, 10.5). In addition, the 12 items of Part E relate directly also to the Thinking objective of inference/logical thinking (1.5).

Table 10 Stanford Test of Academic Skills

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Part A- Comprehen.	51/	51/	51/		51/																/51	/51		51/	51/		51/		51/	51/		/51	
" " - Ref. Materials	15/	15/		15/		15/	15/																	/15				15/			15/		15/
Part B- Vocabulary	27/	27/																			/27	/27		/27	27/					27/		27/	
" " - Punctuation																																	
Expression	18/	18/																															
Logical Sequence	12/	12/			12/																												

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Part A- Comprehen.	51/																							/51		/51			/51			
" " - Ref. Materials		15/	15/			15/										/15			15/			15/	15/									
Part B- Punctuation		21/	21/							21/			/21						/21													
Part C- Spelling		15/																														
Expression		18/	18/							18/			18/			/18			18/			18/	18/									
Logical Sequence		12/	12/							12/			12/			/12			12/			12/	12/									

TABLE 10A

Test Analysis: Specific Items Related to Objectives

Stanford TASK Test of Academic Skills

Level I

Objective	Subtest	Item
	Reading Part A--Comprehension	
1.1		1-51
1.2		1-51
1.3		1-51
1.5		1-51
4.1		(1-51)
4.2		(1-51)
5.1		1-51
5.2		1-51
5.4		1-51
5.6		1-51
6.1		1-51
6.3		(1-51)
7.1		1-51
11.1		(1-51)
11.3		(1-51)
11.6		(1-51)
	Part B--Vocabulary	
1.1		52-78
1.2		52-78
4.1		(52-78)
4.2		(52-78)
5.1		(52-78)
5.2		52-78
6.1		52-78
6.3		52-78

Objective	Subtest	Item
	English Part A--(Use of Reference Materials)	
1.1		1-15
1.2		1-15
1.4		1-15
1.6		1-15
1.7		1-15
5.1		(1-15)
5.5		1-15
6.2		1-15
6.4		1-15
8.1		1-15
8.2		1-15
8.5		1-15
9.1		(1-15)
10.1		1-15
10.4		1-15
10.5		1-15
	Part B--(Punctuation, Grammar, Capitalization)	
8.1		16-36
8.2		16-36
8.9		16-36
8.12		(16-36)
10.1		(16-36)
	Part C--(Spelling)	
8.1		37-51
	Parts D & E--(Expression)	
1.1		52-69
1.2		52-69
8.1		52-69
8.2		52-69
8.9		52-69
8.12		52-69
9.1		(52-69)
10.1		52-69
10.4		52-69
10.5		52-69

DAVIS READING TEST

Description

The Davis Reading Test is designed to measure five categories of reading skills:

1) Finding the answers to questions answered explicitly or in paraphrase in a passage;
2) Weaving together the ideas in a passage and grasping its central thought;
3) Making inferences about the content of a passage and about the purpose or point of view of its author;
4) Recognizing the tone and mood of a passage and the literary devices used by its author;
5) Following the structure of a passage.

The test is especially useful for assessing the overall reading ability of individuals or groups and for measuring growth in the overall reading ability of individuals or groups.

The Davis Reading Test has two series--Series 1 for grades 11 to 13 and Series 2 for grades 8 to 11. This analysis examines Series 2 only.

Summary of Item Analysis

Form 2 of this test consists of 80 items which relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 80 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6).

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Table 11 Davis Reading Test

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING											LISTENING							SPEAKING					READING (Interests)				READING (Processers)							READING (Vocabulary)				
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10		2.1	2.2	2.3	2.4	2.5	2.6		3.1	3.2	3.4	3.5		4.1	4.2	4.3		5.1	5.2	5.3	5.4	5.5	5.6		6.1	6.2	6.3	6.4	
	80/	80/	80/		80/																			/80	/80			80/	80/		80/		80/		80/		/80		

	READING (Rate)				WRITING (Skills)															WRITING (Models)				WRITING (Revising)						VALUES									
	7.1				8.1	.2	3	.4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14		9.1	9.2	9.3		10.1	.2	.3	.4	.5			11.1	.2	.3	.4	.5	.6	.7	.8	.9
	80/																														/80		/80			/80			

TABLE 11A

Test Analysis: Specific Items Related to Objectives

Davis Reading Test

Form 2A

Objective	Subtest	Item
1.1		1-80
1.2		1-80
1.3		1-80
1.5		1-80
4.1		(1-80)
4.2		(1-80)
5.1		1-80
5.2		1-80
5.4		1-80
5.6		1-80
6.1		1-80
6.3		(1-80)
7.1		1-80
11.1		(1-80)
11.3		(1-80)
11.6		(1-80)

DURRELL LISTENING-READING SERIES

Description

This series is designed to provide a comparison of children's reading and listening abilities. Knowledge of discrepancies between a pupil's understanding of spoken language and of printed words is basic to analysis of reading disabilities and diagnosis of remedial needs.

The series consists of tests in both listening and reading. Advanced level is for grades 7 to 9. The tests consist of a vocabulary comprehension test for each level, and a paragraph comprehension test in the Intermediate and Advanced levels.

The vocabulary comprehension test for the Advanced level consists of two parts. The first part asks the pupil to relate the meaning of a word to one of five categories in a cluster. The second part asks him to relate a word to one of five topics or subjects about which he might be reading when he saw the word.

In the listening test the option headings in both subtests are read aloud by the teacher, so that the pupil is tested only on his comprehension of the spoken items.

The paragraph comprehension test contains two parts. The first consists of passages followed by five statements which the pupil is to judge as true, false, or as information not given in the passage. A sixth item following each passage is multiple-choice, offering four options. The second part of the paragraph comprehension test consists of passages comparing and contrasting two people or places that are in some respects similar but in other ways different. Each passage is followed by statements which the pupil is asked to classify as true of the one, true of the other, true of both, or as information not given in the passage.

Summary of Item Analysis

This is the only test battery analysed which includes direct testing of listening skills. The subtests relate directly also to Thinking and Reading objectives and, indirectly, to some Values objectives. Test I is Vocabulary Listening, and consists of two parts. Part A has 140 items which directly relate to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Listening objective of attention/concentration (2.1). Part B has 64 items which relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), inference/logical thinking (1.5), and synthesis of information (1.7), and also to the Listening objective of attention/concentration (2.1). Test 2, Paragraph Listening, has 48 items, all of which relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), inference/logical thinking (1.5), and synthesis of information (1.7), and to the Listening objective of attention/concentration (2.1). Test 3 is Vocabulary Reading, and is in two parts. Part A has 140 items and Part B 64 items. All 204 items directly relate to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 204 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and fluency/efficiency (5.1). Test 4, Paragraph Reading, has 48 items, all of which directly relate to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), as well as to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2),thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 48 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language (11.1, 11.3, 11.6).

Table 12 Durrell Listening-Reading Series

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Listening - A	140/	140/									140/																						
Listening - B	64/	64/			64/		64/				64/																						
Listening - Para.	48/	48/	48/		48/		48/				48/										/140	/140		/140	140/					140/		140/	
Reading - A	40/	40/																															
Reading - B	64/	64/																			/64	/64		/64	64/					64/		64/	
Reading - Para.	48/	48/	48/		48/																/48	/48		48/	48/		48/		48/	48/		/48	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Reading - Para.	48/																							/48		/48			/48			

TABLE 12A

Test Analysis: Specific Items Related to Objectives

Durrell Listening-Reading Series

Objective	Subtest	Item
	Vocabulary Listening Part A	
1.1		1-140
1.2		1-140
2.1		1-140
	Vocabulary Listening Part B	
1.1		1-64
1.2		1-64
1.5		1-64
1.7		1-64
2.1		1-64
	Paragraph Listening	
1.1		1-48
1.2		1-48
1.3		1-48
1.5		1-48
1.7		1-48
2.1		1-48
	Vocabulary Reading Part A	
1.1		1-40
1.2		1-40
4.1		(1-140)
4.2		(1-140)
5.1		(1-140)
5.2		1-140
6.1		1-140
6.3		1-140

Objective	Subtest	Item
	Vocabulary Reading Part B	
1.1		1-64
1.2		1-64
4.1		(1-64)
4.2		(1-64)
5.1		(1-64)
5.2		1-64
6.1		1-64
6.3		1-64
	Paragraph Reading	
1.1		1-48
1.2		1-48
1.3		1-48
1.5		1-48
4.1		(1-48)
4.2		(1-48)
5.1		1-48
5.2		1-48
5.4		1-48
5.6		1-48
6.1		1-48
6.3		(1-48)
7.1		1-48
11.1		(1-48)
11.3		(1-48)
11.6		(1-48)

GATES-MACGINITIE READING TESTS--SURVEY E

Description

Survey E is intended for use in grades 7 through 9. Three equivalent forms of Survey E are available. Each consists of three parts: Speed and Accuracy, Vocabulary, and Comprehension.

The Speed and Accuracy test provides an objective measure of how rapidly students can read with understanding. Each paragraph ends in a question or incomplete statement, and a choice of four words follows. The student's task is to choose the word that, according to the paragraph, best answers the question or completes the statement. The number of paragraphs he completes in the four minutes allowed provides a measure of how rapidly he reads.

The Vocabulary test samples the student's reading vocabulary. This test contains 50 items, each consisting of a test word followed by five other words, one of which is similar in meaning to the test word. The student's task is to choose the word that means most nearly the same as the test word.

The Comprehension test measures the student's ability to read complete prose passages with understanding.

Summary of Item Analysis

The three parts of this test relate to Thinking and Reading objectives, and Values objectives are touched on by the items of one subtest. There are no items relating to Listening, Speaking, or Writing objectives. The Speed and Accuracy subtest has 36 items which relate directly to the

Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 36 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3). The Vocabulary subtest has 50 items, all of which relate to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 50 items relate to confidence (4.1), understanding and enjoyment (4.2), and fluency/efficiency (5.1). The Comprehension subtest has 52 items. These items relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). The 52 items relate indirectly to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6).

Table 13 Gates-MacGinitie Reading Tests--Survey E

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Speed & Accuracy	36/	36/	36/		36/																/36	/36		36/	36/		36/		36/	36/		/36	
Vocabulary	50/	50/																			/50	/50		/50	50/					50/		50/	
Comprehension	52/	52/	52/		52/																/52	/52		52/	52/		52/		52/	52/		/52	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Speed & Accuracy	36/																															
Comprehension	52/																							/52		/52			/52			

TABLE 13A

Test Analysis: Specific Items Related to Objectives

Gates-MacGinitie Reading Tests--Survey E

Objective	Subtest	Item
	Speed & Accuracy	
1.1		1-36
1.2		1-36
1.3		1-36
1.5		1-36
4.1		(1-36)
4.2		(1-36)
5.1		1-36
5.2		1-36
5.4		1-36
5.6		1-36
6.1		1-36
6.3		(1-36)
7.1		1-36
	Vocabulary	
1.1		1-50
1.2		1-50
4.1		(1-50)
4.2		(1-50)
5.1		(1-50)
5.2		1-50
6.1		1-50
6.3		1-50

Objective	Subtest	Item
	Comprehension	
1.1		1-52
1.2		1-52
1.3		1-52
1.5		1-52
4.1		(1-52)
4.2		(1-52)
5.1		1-52
5.2		1-52
5.4		1-52
5.6		1-52
6.1		1-52
6.3		(1-52)
7.1		1-52
11.1		(1-52)
11.3		(1-52)
11.6		(1-52)

GILMORE ORAL READING TEST

Description

The Gilmore Oral Reading Test is an individually administered test which has been developed to provide classroom teachers, reading supervisors, and others particularly concerned with reading instruction, with a means of analysing the oral reading performance of pupils in grades 1 through 8. The test provides measures of accuracy of oral reading, comprehension of material read, and rate of reading.

Summary of Item Analysis

This test of oral reading relates directly and indirectly to certain Thinking and Reading objectives, but not to any of the objectives of Listening, Speaking, Writing, or Values. The Thinking objectives to which the passages relate are those of observation/recall (1.1), comprehension/analysis (1.2), questioning (1.3), and inference/logical thinking (1.5). They also relate directly to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1) Indirectly, they relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3).

Table 14 Gilmore Oral Reading Test

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
	10/	10/	10/		10/																/10	/10		10/	10/		10/		10/	10/		/10	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
	10/																															

TABLE 14A

Test Analysis: Specific Items Related to Objectives

Gilmore Oral Reading Test

Objective	Subtest	Item
	Form C	
1.1		1-10
1.2		1-10
1.3		1-10
1.5		1-10
4.1		(1-10)
4.2		(1-10)
5.1		1-10
5.2		1-10
5.4		1-10
5.6		1-10
6.1		1-10
6.3		(1-10)
7.1		1-10

GRAY ORAL READING TESTS

Description

The two major functions of the Gray Oral Reading Tests are: first, to provide an objective measure of growth in oral reading from early first grade to college; and second, to aid in the diagnosis of oral reading difficulties.

Continuous progress in oral reading may be measured by the 13 passages, each of which is more difficult than the one that precedes it. The first passage may be read by pupils who have completed the pre-primer while the last two passages challenge college students and some adults.

The diagnostic purpose of these tests is accomplished by recording the types of errors made so that insights may be gained into the kinds of instruction needed.

The comprehension questions require only literal meaning and chiefly the details of what is read. They are designed to determine the extent of understanding at the simplest level.

Summary of Item Analysis

Each of the thirteen graded reading passages, with its four comprehension questions, relates directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, each test passage relates to the development of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3). There is no measurement of achievement of Listening, Speaking, Writing, and Values objectives.

Table 15 Gray Oral Reading Tests

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
	13/	13/	13/		13/																/13	/13		13/	13/		13/		13/	13/		/13	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
	13/																															

TABLE 15A

Test Analysis: Specific Items Related to Objectives

Gray Oral Reading Tests

Objective	Subtest	Item
1.1		1-13
1.2		1-13
1.3		1-13
1.5		1-13
4.1		(1-13)
4.2		(1-13)
5.1		1-13
5.2		1-13
5.4		1-13
5.6		1-13
6.1		1-13
6.3		(1-13)
7.1		1-13

IOWA SILENT READING TESTS

Description

The 1972 edition Iowa Silent Reading Tests survey the specific areas in which the pupil must have developed competence in order to read effectively. These areas include vocabulary, reading comprehension, use of reference materials, skimming and scanning for specific information, and speed of reading with comprehension. Together, the tests provide a measure of the pupil's ability to read, both in the classroom and for his own enjoyment.

Summary of Item Analysis

As the name implies, the focus of these tests is on the measurement of Reading achievement. There is some testing of Thinking objectives, and some Values objectives are indirectly touched upon. There is no measurement of Listening, Speaking, or Writing objectives.

The Vocabulary subtest of 50 items directly measures achievement of the Thinking objectives of observation/recall (1.1), and comprehensive/analysis (1.2), and of Reading objectives such as focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, these 50 items relate to the development of confidence (4.1), understanding/enjoyment (4.2), and fluency/efficiency (5.1) in Reading. Part A of the Reading Comprehension subtest has 38 items and Part B 12 items. These 50 items directly test the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/

logical thinking (1.5), and the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, these 50 items touch on the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and understanding of denotation (6.3), and on the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6).

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Table 16 Iowa Silent Reading Tests

ENGLISH

Code: direct / indirect

NAME OF SUBTEST	THINKING 1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	LISTENING 2.1	2.2	2.3	2.4	2.5	2.6	SPEAKING 3.1	3.2	3.4	3.5
Vocabulary	50/	50/																		
Comprehension - A	38/	38/	38/		38/															
" - B	12/	12/	12/		12/															

NAME OF SUBTEST	READING (Interests) 4.1	4.2	4.3	READING (Processers) 5.1	5.2	5.3	5.4	5.5	5.6	READING (Vocabulary) 6.1	6.2	6.3	6.4
Vocabulary	/50	/50		/50	50/					50/		50/	
Comprehension - A	/38	/38		38/	38/		38/		38/	38/		/38	
" - B	/12	/12		12/	12/		12/		12/	12/		/12	

NAME OF SUBTEST	READING (Rate) 7.1	WRITING (Skills) 8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14
Vocabulary															
Comprehension- A	38/														
" -B	12/														

NAME OF SUBTEST	WRITING (Models) 9.1	9.2	9.3	WRITING (Revising) 10.1	.2	.3	.4	.5	VALUES 11.1	.2	.3	.4	.5	.6	.7	.8	.9
Vocabulary																	
Comprehension- A									/38		/38			/38			
" -B									/12		/12			/12			

TABLE 16A

Test Analysis: Specific Items Related to Objectives

Iowa Silent Reading Tests

Objective	Subtest	Item
	Vocabulary	
1.1		1-50
1.2		1-50
4.1		(1-50)
4.2		(1-50)
5.1		(1-50)
5.2		1-50
6.1		1-50
6.3		1-50
	Reading Comprehension (Part A)	
1.1		1-38
1.2		1-38
1.3		1-38
1.5		1-38
4.1		(1-38)
4.2		(1-38)
5.1		1-38
5.2		1-38
5.4		1-38
5.6		1-38
6.1		1-38
6.3		(1-38)
7.1		1-38
11.1		(1-38)
11.3		(1-38)
11.6		(1-38)

Objective	Subtest	Item
	Reading Comprehension (Part B)	
1.1		1-12
1.2		1-12
1.3		1-12
1.5		1-12
4.1		(1-12)
4.2		(1-12)
5.1		1-12
5.2		1-12
5.4		1-12
5.6		1-12
6.1		1-12
6.3		(1-12)
7.1		1-12
11.1		(1-12)
11.3		(1-12)
11.6		(1-12)

THE NELSON READING SKILLS TEST

Description

Reasons for using this test would be:

1) To assess student progress in specified reading tasks over a period of time;
2) To facilitate better selection of materials for optimum reading growth;
3) To facilitate the development of instructional strategies most appropriate for individual student differences;
4) To identify individual strengths and weaknesses;
5) To obtain information for initial in-class grouping of students.

Level C tests are for grades 7, 8, and 9.

Summary of Item Analysis

The three subtests relate directly to the English curriculum objectives for Reading and Thinking, and indirectly to some of the Values objectives. The Word Meaning subtest has 29 items which relate directly to the Thinking objectives of observation/recall (1.1), and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). These 29 items relate indirectly to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and fluency/efficiency (5.1). The

Reading Comprehension subtest has 41 items, all of which relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 41 items relate to the development of confidence (4.1), understanding of denotation (6.3), as well as to the Values objectives of developing appreciation of the role language plays in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). The whole of the Reading Rate subtest measures Reading objective 7.1: "to read at adequate and appropriate speeds".

Table 17 The Nelson Reading Skills Test

ENGLISH

Code: direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING					READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Word Meaning	29/	29/																				/29	/29		/29	29/					29/		29/	
Comprehension	44/	41/	44/		44/																	/41	/41		44/	44/		44/		44/	44/		/44	
Reading Rate																																		

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Word Meaning																																
Comprehension	41/																							/41		/41			/41			
Reading Rate	10/																															

TABLE 17A

Test Analysis: Specific Items Related to Objectives

The Nelson Reading Skills Test

Level C

Objective	Subtest	Item
	Word Meaning	
1.1		1-29
1.2		1-29
4.1		(1-29)
4.2		(1-29)
5.1		(1-29)
5.2		1-29
6.1		1-29
6.3		1-29
	Reading Comprehension	
1.1		1-41
1.2		1-41
1.3		1-41
1.5		1-41
4.1		(1-41)
4.2		(1-41)
5.1		1-41
5.2		1-41
5.4		1-41
5.6		1-41
6.1		1-41
6.3		(1-41)
7.1		1-41
11.1		(1-41)
11.3		(1-41)
11.6		(1-41)
	Reading Rate	
7.1		Whole test

THE NELSON-DENNY READING TEST--FORMS C AND D

Description

This test provides a measure of all three major elements of reading ability: vocabulary, comprehension, and reading rate. These new forms are designed for use in grades 9 through 13.

Summary of Item Analysis

There are two parts to this test: a vocabulary subtest, and a comprehension subtest which is also used to measure reading rate. The subtests relate to Thinking, Reading, and (indirectly) Values objectives, but not at all to Listening, Speaking, and Writing objectives. The Vocabulary subtest consists of 100 items which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 100 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and fluency/efficiency (5.1). The Comprehension subtest has 36 items which relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), questioning (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), and word recognition (6.1). Indirectly, the 36 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3).

Table 18 The Nelson-Denny Reading Test

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Comprehension	36/	36/	36/		36/																/36	/36		36/	36/		36/		36/	36/		/36	
Word Meaning	100/	100/																			/100	/100		/100	100/					100/		100/	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	-9
Comprehension	36/																							/36		/36			/36			

TABLE 18A

Test Analysis: Specific Items Related to Objectives

The Nelson-Denny Reading Test

Forms C and D

Objective	Subtest	Item
	Comprehension	
1.1		1-36
1.2		1-36
1.3		1-36
1.5		1-36
4.1		(1-36)
4.2		(1-36)
5.1		1-36
5.2		1-36
5.4		1-36
5.6		1-36
6.1		1-36
6.3		(1-36)
7.1		1-36
11.1		(1-36)
11.3		(1-36)
11.6		(1-36)
	Word Meaning	
1.1		1-100
1.2		1-100
4.1		(1-100)
4.2		(1-100)
5.1		(1-100)
5.2		1-100
6.1		1-100
6.3		1-100

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PRESSEY DIAGNOSTIC READING TESTS--FORM A

Description

Careful study and experimentation led to the conclusion that three types of test were needed: a consistent series of vocabulary tests yielding measures of general reading vocabulary from the first grade through junior high school; a test of the extent to which the mechanics of reading have been mastered; and a test measuring the extent to which the pupil has progressed beyond the sentence as a unit of understanding and has come to grasp, as wholes, larger units of thought.

Summary of Item Analysis

Three subtests make up this test: Vocabulary, Paragraph Meaning, and Speed. They relate to objectives of Thinking and Reading and, indirectly, to certain of the Values objectives. Listening, Speaking, and Writing are not touched upon. There are 100 items in the Vocabulary subtest, directly related to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 100 items relate to the Reading objectives of developing confidence (4.1), understanding and enjoyment (4.2), and fluency/efficiency (5.1). In the Paragraph Meaning subtest, there are 60 items, relating directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), questioning (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, these 60 items relate to the Reading objectives of developing confidence (4.1), understanding and enjoyment (4.2), understanding of denotation (6.3), and to the Values objectives of appreciation of the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). The Speed subtest directly relates to Reading objective 7.1: "to read at speeds that are adequate for comprehension and appropriate for the reader's purpose".

Table 19 Pressey Diagnostic Reading Tests

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Vocabulary	100/	100/																			/100	/100		/100	100/					100/		100/	
Para. Meaning	60/	60/	60/		60/																/60	/60		60/	60/		60/		60/	60/		/60	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Para. Meaning	60/																							/60		/60			/60			
Speed	66/																															

TABLE 19A

Test Analysis: Specific Items Related to Objectives

Pressey Diagnostic Reading Tests

Form A

Objective	Subtest	Item
	Vocabulary	
1.1		1-100
1.2		1-100
4.1		(1-100)
4.2		(1-100)
5.1		(1-100)
5.2		1-100
6.1		1-100
6.3		1-100
	Paragraph Meaning	
1.1		1- 60
1.2		1- 60
1.3		1- 60
1.5		1- 60
4.1		(1- 60)
4.2		(1- 60)
5.1		1- 60
5.2		1- 60
5.4		1- 60
5.6		1- 60
6.1		1- 60
6.3		(1- 60)
7.1		1- 60
11.1		(1- 60)
11.3		(1- 60)
11.6		(1- 60)
	Speed	
7.1		1- 66

SRA READING RECORD

Description

The SRA Reading Record is a diagnostic device that pinpoints the students' strengths and weaknesses in reading skills. It was designed to give the student the greatest possible motivation in improving his reading skills, and may be used with junior and senior high school students (grades 6 to 12).

Summary of Item Analysis

Items from the ten subtests of the SRA Reading Record relate directly to Thinking and Reading objectives, and indirectly to several of the Values objectives, but no items relate directly or indirectly to Listening, Speaking, or Writing objectives. The first subtest, Reading Rate, relates to the Reading objective of appropriate speed (7.1). The 16 items of subtest 2, Comprehension, and the 10 items of subtest 3, Paragraph Meaning, relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 26 items of these two subtests relate to the Reading attitude objectives (4.1, 4.2), and to understanding of denotation (6.3), and to the Values objectives of appreciating language's role in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). Subtest 4, Directory Reading, measures the Thinking objective of synthesizing information (1.7), and the Reading objective of appropriate speed (7.1). The 12 items of subtest 5 (Map-Table-Graph), the 20 items of subtest 6 (Advertisements), and the 14 items of subtest 7 (Index Usage) relate to the Thinking objective of synthesizing information (1.7), subtests 6 and 7 directly and subtest 5 indirectly. Subtest 8 (Technical Vocabulary) has 23 items, subtest 9 (Sentence Meaning) 19 items, and subtest 10 (General Vocabulary) 25 items. These 67 items all relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 67 items relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and fluency/efficiency (5.1).

Table 20 SRA Reading Record

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING					
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6
Reading Rate																
Comprehension	16/	16/	16/		16/											
Para. Meaning	10/	10/	10/		10/											
Directory Rdg.							25/									
Map, Table Rdg.							/12									
Advertisements							20/									
Index Usage							14/									
Technical Vocab.	23/	23/														
Sentences	19/	19/														
General Vocab.	25/	25/														

NAME OF SUBTEST	SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Reading Rate																	
Comprehension					/16	/16		16/	16/		16/		16/	16/		/16	
Para. Meaning					/10	/10		10/	10/		10/		10/	10/		/10	
Directory Rdg.																	
Map, Table Rdg.																	
Advertisements																	
Index Usage																	
Technical Vocab.					/23	/23		/23	23/					23/		23/	
Sentences					/19	/19		/19	19/					19/		19/	
General Vocab.					/25	/25		/25	25/					25/		25/	

	READING (Rate)	WRITING (Skills)													
	7.1	8.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14
Reading Rate	ALL														
Comprehension	16/														
Para. Meaning	10/														
Directory Rdg.	25/														
Map, Table Rdg.															
Advertisements															
Technical Vocab.															
Sentences															
General Vocab.															

	WRITING (Models)			WRITING (Revising)					VALUES								
	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Reading Rate																	
Comprehension									/16		/16			/16			
Para. Meaning									/10		/10			/10			
Directory Rdg.																	
Map, Table Rdg.																	
Advertisements																	
Technical Vocab.																	
Sentences																	
General Vocab.																	

TABLE 20A

Test Analysis: Specific Items Related to Objectives

SRA Reading Record

Objective	Subtest	Item
	1--Reading Rate	
7.1		Whole Test
	2--Comprehension	
1.1		1-16
1.2		1-16
1.3		1-16
1.5		1-16
4.1		(1-16)
4.2		(1-16)
5.1		1-16
5.2		1-16
5.4		1-16
5.6		1-16
6.1		1-16
6.3		(1-16)
7.1		1-16
11.1		(1-16)
11.3		(1-16)
11.6		(1-16)
	3--Paragraph Meaning	
1.1		1-10
1.2		1-10
1.3		1-10
1.5		1-10
4.1		(1-10)
4.2		(1-10)
5.1		1-10
5.2		1-10
5.4		1-10
5.6		1-10
6.1		1-10
6.3		(1-10)

Objective	Subtest	Item
	3--Paragraph Meaning Continued	
7.1		1-10
11.1		(1-10)
11.3		(1-10)
11.6		(1-10)
	4--Directory Reading	
1.7		1-25
7.1		1-25
	5--Map, Table, Graph	
1.7		(1-12)
	6--Advertisements	
1.7		1-20
	7--Index Usage	
1.7		1-14
	8--Technical Vocabulary	
1.1		1-23
1.2		1-23
4.1		(1-23)
4.2		(1-23)
5.1		(1-23)
5.2		1-23
6.1		1-23
6.3		1-23
	9--Sentence Meaning	
1.1		1-19
1.2		1-19
4.1		(1-19)
4.2		(1-19)
5.1		(1-19)
5.2		1-19
6.1		1-19
6.3		1-19

Objective	Subtest	Item
	10--General Vocabulary	
1.1		1-25
1.2		1-25
4.1		(1-25)
4.2		(1-25)
5.1		(1-25)
5.2		1-25
6.1		1-25
6.3		1-25

STANFORD ACHIEVEMENT TEST--HIGH SCHOOL READING (Grades 9-12)

Description

The development of this test battery centred around two major aspects of the curriculum, general education and specialization. High school students, prior to graduation, are expected to develop certain competencies necessary for a satisfying and productive adult life. In some subject-matter fields this leads to three or four years of study for all students, as is often the case in such fields as English.

Summary of Item Analysis

The High School Reading subtest has 65 items. These items relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 65 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3) and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6).

Table 21 Stanford Achievement Test--High School Reading

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Comprehension	65/	65/	65/		65/																/65	/65		65/	65/		65/		65/	65/		/65	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Comprehension	65/																							/65		/65			/65			

TABLE 21A

Test Analysis: Specific Items Related to Objectives

Stanford Achievement Test

High School Reading (Grades 9-12)

Objective	Subtest	Item
	Reading Comprehension	
1.1		1-65
1.2		1-65
1.3		1-65
1.5		1-65
4.1		(1-65)
4.2		(1-65)
5.1		1-65
5.2		1-65
5.4		1-65
5.6		1-65
6.1		1-65
6.3		(1-65)
7.1		1-65
11.1		(1-65)
11.3		(1-65)
11.6		(1-65)

STANFORD DIAGNOSTIC READING TEST

Description

The Stanford Diagnostic Reading Test (SDRT) Level III is designed to assess the major aspects of the reading process. Ideally it should be used at the onset of instruction in reading, so that the teacher can diagnose the specific needs of each student and prescribe the appropriate instructional strategies and materials. The test is, therefore, essentially an instructional tool; it is designed to be administered, scored, and interpreted by the teacher.

The test is intended for those students who seek help in improving their reading ability, and for those assigned to certain classes whose purpose is to teach reading skills.

Summary of Item Analysis

The Stanford Diagnostic Reading Test has 7 parts: 1)Reading Comprehension, 2)Word Meaning, 3)Word Parts, 4)Phonetic Analysis, 5)Structural Analysis, 6)Scanning and Skimming, and 7)Fast Reading. Tests 3, 4, and 5 are not analysed here. The other four tests touch on Thinking, Reading, and, indirectly, Values objectives. Test 1, Reading Comprehension, has 60 items and Test 6, Scanning and Skimming, 32 items. These 92 items all relate directly to the Thinking objectives of observation/recall (1.1), comprehension/ analysis (1.2), handling questions (1.3), and inference/ logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1).

Indirectly, the 92 items relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). The Word Meaning test has 30 items, all of which relate directly to the Thinking objectives of observation/recall (1.1), and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 30 items relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and fluency/efficiency (5.1). The Fast Reading test also has 30 items. These 30 items relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 30 items relate to the Reading objectives of confidence (4.1) and understanding/enjoyment (4.2).

Table 22 Stanford Diagnostic Reading Test

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Comprehension	60/	60/	60/		60/																/60	/60		60/	60/		60/		60/	60/		/60	
Vocabulary	30/	30/																			/30	/30		/30	30/					30/		30/	
Skimming	16/	16/	16/		16/																/16	/16		16/	16/		16/		16/	16/		/16	
Fast Reading	30/	30/			30/																/30	/30		30/	30/		30/			30/			

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	.2	3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	-9
Comprehension	60/																							/60		/60			/60			
Skimming	16/																							/16		/16			/16			
Fast Reading	30/																															

TABLE 22A

Test Analysis: Specific Items Related to Objectives

Stanford Diagnostic Reading Test

Level III

Objective	Subtest	Item
	Reading Comprehension	
1.1		1-60
1.2		1-60
1.3		1-60
1.5		1-60
4.1		(1-60)
4.2		(1-60)
5.1		1-60
5.2		1-60
5.4		1-60
5.6		1-60
6.1		1-60
6.3		(1-60)
7.1		1-60
11.1		(1-60)
11.3		(1-60)
11.6		(1-60)
	Vocabulary	
1.1		1-30
1.2		1-30
4.1		(1-30)
4.2		(1-30)
5.1		(1-30)
5.2		1-30
6.1		1-30
6.3		1-30

Objective	Subtest	Item
	Skimming	
1.1		1-32
1.2		1-32
1.3		1-32
1.5		1-32
4.1		(1-32)
4.2		(1-32)
5.1		1-32
5.2		1-32
5.4		1-32
5.6		1-32
6.1		1-32
6.3		(1-32)
7.1		1-32
11.1		(1-32)
11.3		(1-32)
11.6		(1-32)
	Fast Reading	
1.1		1-30
1.2		1-30
1.5		1-30
(4.1)		(1-30)
(4.2)		(1-30)
5.1		1-30
5.2		1-30
5.4		1-30
6.1		1-30
7.1		1-30

TRAXLER SILENT READING TEST--FORM 1

Description

This test was designed to furnish teachers, counsellors, and administrators with information concerning four important questions about the reading ability of pupils in grades 7 to 10 inclusive. These questions, listed without regard to order of importance, are:

1. How fast do the pupils read interesting material of appropriate difficulty for them?
2. How well do they understand the meaning of words used in materials suited to their age and grade level?
3. Can they grasp essential facts and ideas in simple, interesting material from one perusal of it?
4. How much power of comprehension do they have--that is, what level of difficulty can they reach if they have plenty of time and are allowed to reread?

Test of story comprehension: The pupils' understanding of the story read in the rate test is measured with ten multiple-choice questions, which they answer as soon as they have finished reading the story. The questions are so arranged that they cover the more important points in the story.

Test of word meaning: The words in the reading vocabulary test are found in the fourth to the tenth thousand of Thorndike and Lorge's "The Teacher's Word Book of 30,000 Words," which contains the thirty thousand words that occurred most frequently in a word count of reading materials.

Test of paragraph comprehension: The purpose of this part of the test is to measure power of comprehension--that is, ability to read material of varying levels of difficulty.

Summary of Item Analysis

This test relates to Thinking and Reading objectives and, indirectly, to several Values objectives, but not to Listening, Speaking, or Writing objectives. Part I of the test measures Reading Rate and Story Comprehension. The 10 items in this part relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5). They relate directly also to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 10 items relate to the Reading objectives of developing confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). Part II is concerned with Word Meaning, and its 50 items relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 50 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and fluency/efficiency (5.1). Part III is a test of Paragraph Comprehension. The 20 items relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 20 items relate to developing confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language (11.1, 11.3, 11.6).

Table 23 Traxler Silent Reading Test--Form 1

ENGLISH

Code: direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Story Reading	10/	10/	10/		10/																/10	/10		10/	10/		10/		10/	10/		/10	
Word Meaning	50/	50/																			/50	/50		/50	50/					50/		50/	
Para. Reading	20/	20/	20/		20/																/20	/20		20/	20/		20/		20/	20/		/20	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Story Reading	10/																							/10		/10			/10			
Word Meaning																																
Para. Reading	20/																							/20		/20			/20			

TABLE 23A

Test Analysis: Specific Items Related to Objectives

Traxler Silent Reading Test

Form 1

Objective	Subtest	Item
	Reading Rate and Story Comprehension	
1.1		1-10
1.2		1-10
1.3		1-10
1.5		1-10
4.1		(1-10)
4.2		(1-10)
5.1		1-10
5.2		1-10
5.4		1-10
5.6		1-10
6.1		1-10
6.3		(1-10)
7.1		1-10
11.1		(1-10)
11.3		(1-10)
11.6		(1-10)
	Word Meaning	
1.1		1-50
1.2		1-50
4.1		(1-50)
4.2		(1-50)
5.1		(1-50)
5.2		1-50
6.1		1-50
6.3		1-50

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Objective	Subtest	Item
	Paragraph Comprehension	
1.1		1-20
1.2		1-20
1.3		1-20
1.5		1-20
4.1		(1-20)
4.2		(1-20)
5.1		1-20
5.2		1-20
5.4		1-20
5.6		1-20
6.1		1-20
6.3		(1-20)
7.1		1-20
11.1		(1-20)
11.3		(1-20)
11.6		(1-20)

SRA MASTERY--SOBAR READING--CATALOGUE OF OBJECTIVES

Description

This catalogue contains a listing of 140 reading objectives appropriate for testing mastery of reading skills in grades 3 through 9.

A SOBAR Reading mastery test measures students' strengths and weaknesses with regard to local curriculum goals. A curriculum or test coordinator selects 10 to 40 objectives from this catalogue that are considered relevant to the local school system's instructional program.

Summary of Item Analysis

This is really a catalogue of objectives corresponding to a bank of items. The tests can be custom-made, or may be acquired ready-made in various forms. The item analysis relates the objectives in the catalogue to the objectives in the English curriculum. The "subtests" mentioned below are really sets of objectives which might be covered on a particular subtest. A Reading Comprehension subtest, for example, would be composed by choosing from among 25 of the objectives in the catalogue. These 25 objectives directly parallel the English curriculum Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 25 objectives relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and understanding of denotation (6.3), and the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). Thirteen Vocabulary objectives would form the basis of a Vocabulary subtest. These 13 objectives directly relate to the English curriculum Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, these 13 objectives relate to the Reading objectives of confidence (4.1), understanding/enjoyment (4.2), and fluency/efficiency (5.1). To create a test of Study Skills, 27 objectives would be considered. These 27 objectives relate directly to the Thinking objectives of gathering, assessing, and synthesizing information (1.4, 1.6, 1.7), to the Reading objectives of handling information (5.5) and using reference materials (6.2, 6.4), and to the Writing objective of developing reporting skills (8.5). Indirectly, the 27 objectives relate to the Reading objective of fluency/efficiency (5.1). To test Punctuation and Capitalization, three objectives are relevant, each of which parallels directly the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in handling information (8.9), and indirectly those of performing school writing tasks (8.12) and editing (10.1). Language Usage may be tested by using 23 objectives, all of which relate directly to the thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and in editorial skills (10.1, 10.4, 10.5). Indirectly, these 23 objectives relate to the Writing objective of inferring language usage principles from models (9.1).

Table 24 SRA Mastery - SOBAR Reading

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5
Comprehension	25/	25/	25/		25/															
Vocabulary	13/	13/																		
Study Skills				27/		27/	27/													
Punctuation																				
Usage	23/	23/																		

NAME OF SUBTEST	READING (Interests)			READING (Processers)						READING (Vocabulary)			
	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Comprehension	/25	/25		25/	25/		25/		25/	25/		/25	
Vocabulary	/13	/13		/13	13/					13/		13/	
Study Skills				/27				27/			27/		27/
Punctuation													
Usage													

NAME OF SUBTEST	READING (Rate)	WRITING (Skills)													
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14
Comprehension	25/														
Vocabulary															
Study Skills						27/									
Punctuation		3/	3/							3/			/3		
Usage		23/	23/												

NAME OF SUBTEST	WRITING (Models)			WRITING (Revising)					VALUES								
	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Comprehension									/25		/25			/25			
Vocabulary																	
Study Skills																	
Punctuation				/3													
Usage	/23			23/			23/	23/									

TABLE 24A

Test Analysis: Specific Items Related to Objectives

SRA Mastery--SOBAR Reading

Catalogue of Objectives

Objective	Analysis
1.1	Direct
1.2	Direct
1.3	Direct
1.5	Direct
4.1	Indirect
4.2	Indirect
5.1	Direct
5.2	Direct
5.4	Direct
5.6	Direct
6.1	Direct
6.3	Indirect
7.1	Direct
11.1	Indirect
11.3	Indirect
11.6	Indirect

The above mentioned objectives relate either directly or indirectly to the items mentioned below:

Subtest Comprehension: 1E1 to 1E25

Objective	Analysis
1.1	Direct
1.2	Direct
4.1	Indirect
4.2	Indirect
5.1	Indirect
5.2	Direct
6.1	Direct
6.3	Direct

The above mentioned objectives relate either directly or indirectly to the items mentioned below:

Subtest Vocabulary: 1D1 to 1D13

Objective	Analysis
1.4	Direct
1.6	Direct
1.7	Direct
5.1	Indirect
5.5	Direct
6.2	Direct
6.4	Direct
8.5	Direct

The above mentioned objectives relate either directly or indirectly to the items mentioned below:

Subtest Study Skills: 1F1 to 1F27

Objective	Analysis
8.1	Direct
8.2	Direct
8.9	Direct
8.12	Indirect
10.1	Indirect

The above mentioned objectives relate either directly or indirectly to the items mentioned below:

Subtest Punctuation and Capitalization: 1C41, IC42, IC43

Objective	Analysis
1.1	Direct
1.2	Direct
8.1	Direct
8.2	Direct
9.1	Indirect
10.1	Direct
10.4	Direct
10.5	Direct

The above mentioned objectives relate either directly or indirectly to the items mentioned below:

Subtest Language Usage: 1C14 to 1C36

SCORE CRITERION REFERENCED TESTING SERVICE-- READING AND LANGUAGE ARTS OBJECTIVES

Description

SCORE is a criterion referenced testing service unique in both scope and flexibility. It combines performance objectives with an extensive bank of multiple-choice test items. The performance objectives have been selected to cover the major topics mostly widely taught in grades 1 to 8.

Summary of Item Analysis

The SCORE Criterion Referenced Testing Service stores items that can be drawn from a bank in accordance with objectives selected by the teacher from a catalogue. In the area of Reading Comprehension, the catalogue lists 24 objectives for which items may be selected, and in Analysis and Classification of Written Materials, 22 objectives. These 46 objectives relate directly to certain thinking objectives of the Intermediate English Curriculum, viz., observation/recall (1.1), comprehension/analysis (1.2), questioning (1.3), and inference/logical thinking (1.5). They relate directly also to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), increasing complexity (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 46 items relate to the Reading objectives of confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3), and to the Values objectives of appreciating the role of language in developing perception (11.1) and sense of self (11.3), and in deepening awareness (11.6). In the area of Word Meaning and Structure, there are 16 objectives which relate directly to the Thinking objectives of observation/recall (1.1) and comprehension/analysis (1.2), and to the

Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 16 objectives relate to developing confidence (4.1), understanding and enjoyment (4.2). and fluency/efficiency (5.1). In the area of Study Skills, the 14 objectives relate directly to the Thinking objectives of gathering, assessing, and synthesizing information (1.4, 1.6, 1.7), to the Reading objectives of obtaining and using information (5.5) and using reference works (6.2, 6.4), and to the Writing objectives of accurate observation and reporting (8.5). Indirectly, the 14 objectives relate to the Reading objective of fluency/efficiency (5.1). For Capitalization, Punctuation, and Spelling, there are 17 objectives which relate directly to the Writing objectives of proficiency in the basic skills (8.1, 8.2) and use of correct form (8.9), and indirectly to the Writing objectives of increasing precision in school writing tasks (8.12) and in editing (10.11). The three areas of Parts of Speech, Usage, and Sentence Patterns, Types, and Components have a total of 71 objectives, and Transformational Grammar and Writing Skills together have 20 objectives. These 91 objectives touch directly on the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), and the Writing objectives of proficiency in basic skills (8.1, 8.2) and in editorial skills (10.1, 10.4, 10.5). Indirectly, the 91 objectives relate to the Writing objective of inferring language principles from models (9.1).

Table 25 SCORE Criterion Referenced Testing Service

ENGLISH

Code: direct/indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5
Comprehension	24/	24/	24/		24/															
Classification	22/	22/	22/		22/															
Word Meaning	16/	16/																		
Study Skills				14/		14/	14/													
Capitalization																				
Usage	71/	71/																		
Grammar	20/	20/																		

NAME OF SUBTEST	READING (Interests)			READING (Processers)						READING (Vocabulary)			
	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Comprehension	/24	/24		24/	24/		24/		24/	24/		/24	
Classification	/22	/22		22/	22/		22/		22/	22/		/22	
Word Meaning	/16	/16		/16	16/					16/		16/	
Study Skills				/14				14/			14/		14/
Capitalization													
Usage													
Grammar													

	READING (Rate)	WRITING (Skills)													
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14
Comprehension	24/														
Classification	22/														
Word Meaning															
Study Skills						14/									
Capitalization		17/	17/							17/			/17		
Usage		71/	71/												
Grammar		20/	20/												

	WRITING (Models)			WRITING (Revising)					VALUES								
	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Comprehension									/24		/24			/24			
Classification									/22		/22			/22			
Word Meaning																	
Study Skills																	
Capitalization				/17													
Usage	/71			71/			71/	71/									
Grammar	/20			20/			20/	20/									

TABLE 25A

Test Analysis: Specific Items Related to Objectives

SCORE Criterion Referenced Testing Service--
Reading and Language Arts Objectives
Grades 3 to 8

Objective	Analysis
1.1	Direct
1.2	Direct
1.3	Direct
1.5	Direct
4.1	Indirect
4.2	Indirect
5.1	Direct
5.2	Direct
5.4	Direct
5.6	Direct
6.1	Direct
6.3	Indirect
7.1	Direct
11.1	Indirect
11.3	Indirect
11.6	Indirect

The above mentioned objectives relate either directly or indirectly to the numbered items in the tests, as noted.

Subtest E--Reading Comprehension:
5194, 0485, 2493, 1923, 5011, 0648, 7178, 2050, 6123, 0599, 4307, 3579, 3682, 8146, 5769, 5681, 0680, 5217, 6660, 5325, 3335, 3694, 4671, 3050

Subtest F--Analysis and Classification of Written Materials:
4103, 5652, 6336, 8490, 4928, 1756, 3013, 7648, 2608, 4445, 5877, 1077, 4017, 2695, 0255, 7969, 8946, 5674, 6212, 7710, 6483, 7949

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Objective	Analysis
1.1	Direct
1.2	Direct
4.1	Indirect
4.2	Indirect
5.1	Indirect
5.2	Direct
6.1	Direct
6.3	Direct

The above mentioned objectives relate either directly or indirectly to the numbered items in the tests, as noted.

Subtest C--Word Meaning and Structure:

1436, 6912, 0465, 2165, 3215, 7759, 1764, 0066, 4287, 8055, 2729, 6939, 6770, 7803, 3312, 8383

Objective	Analysis
1.4	Direct
1.6	Direct
1.7	Direct
5.1	Indirect
5.5	Direct
6.2	Direct
6.4	Direct
8.5	Direct

The above mentioned objectives relate either directly or indirectly to the numbered items in the tests, as noted.

Subtest H--Study Skills

4342, 7376, 0810, 5064, 0424, 0605, 8831, 4995, 5228, 8031, 6964, 3577, 4992, 0023

Objective	Analysis
8.1	Direct
8.2	Direct
8.9	Direct
8.12	Indirect
10.1	Indirect

The above mentioned objectives relate either directly or indirectly to the numbered items in the tests, as noted.

Subtest I--Capitalization
Subtest J--Punctuation
Subtest K--Spelling

8903, 6700, 2209, 8459, 8277, 4303, 6438, 0030, 5195, 1875, 3529, 3822, 4629, 6456, 1095, 8278, 8266

Objective	Analysis
1.1	Direct
1.2	Direct
8.1	Direct
8.2	Direct
9.1	Indirect
10.1	Direct
10.4	Direct
10.5	Direct

The above mentioned objectives relate either directly or indirectly to the numbered items in the tests, as noted.

Subtest L--Parts of Speech
Subtest M--Usage
Subtest N--Sentence Patterns, Types, and Components

7451, 8447, 4648, 6210, 7737, 1521, 2939, 8394, 8902, 1364, 0710, 1012, 3040, 6128, 4274, 2245, 0057, 8708, 3647, 0151, 3774, 7640, 3896, 0382, 8272, 3279, 7645, 6811, 1223, 4457, 0930, 6625, 0820, 8751, 1913, 4779, 2101, 1388, 8737, 5382, 6496, 3187, 4577, 5647, 1825, 6337, 7979, 4747, 7395, 1864, 4472, 1693, 8273, 4004, 3790, 4341, 2805, 1617, 0876, 8312, 4473, 4417, 5090, 1933, 0889, 2617, 0365, 4386, 5463, 1911, 6555

Objective	Analysis
1.1	Direct
1.2	Direct
8.1	Direct
8.2	Direct
9.1	Indirect
10.1	Direct
10.4	Direct
10.5	Direct

The above mentioned objectives relate either directly or indirectly to the numbered items in the tests, as noted.

Subtest O--Transformational Grammar
Subtest P--Writing Skills

2483, 8203, 6572, 2411, 4786, 8703, 2610, 6064, 1273, 4260, 7606, 6574, 5907, 3133, 4397, 8884, 7141, 0277, 3614, 8245

COOPERATIVE LITERATURE TESTS

Description

All of the Cooperative Literature Tests were designed to be administered as "open book" tests, and the norms were secured under these conditions. Unless a teacher has a special reason to the contrary, students should be allowed to use their copy of the text and their notes during the test.

These tests are designed to test the students' ability to read and understand literary work.

Teachers should not be discouraged if their students do not stand as high on these norms as they usually do on standardized tests. The schools represented in these norms volunteered their cooperation, hence they are likely to be strong, secure, test-using schools with better prepared students than one would find in a random sample of schools. The norms must therefore be taken as an indication of the comparative performance of students in the better schools of the nation.

Summary of Item Analysis

Each of these tests concentrates on one novel or play, and contains 40 items. These 40 items relate directly to the Thinking objectives of observation/recall (1.1), comprehension/analysis (1.2), handling questions (1.3), and inference/logical thinking (1.5), and to the Reading objectives of fluency/efficiency (5.1), focus on meaning (5.2), thinking while reading (5.4), following increasingly complex patterns (5.6), word recognition (6.1), and appropriate speed (7.1). Indirectly, the 40 items relate to the Reading objectives of developing confidence (4.1), understanding and enjoyment (4.2), and understanding of denotation (6.3) and to the Values objectives of developing an appreciation of the role language plays in developing perception (11.1)and sense of self (11.3), and in deepening awareness (11.6).

Table 26 Cooperative Literature Test

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
Literature	40/	40/	40/		40/																/40	/40		40/	40/		40/		40/	40/		/40	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9
Literature	40/																							/40		/40			/40			

TABLE 26A

Test Analysis: Specific Items Related to Objectives

Cooperative Literature Tests

Objective	Subtest	Item
	Literature	
1.1		1-40
1.2		1-40
1.3		1-40
1.5		1-40
4.1		(1-40)
4.2		(1-40)
5.1		1-40
5.2		1-40
5.4		1-40
5.6		1-40
6.1		1-40
6.3		(1-40)
7.1		1-40
11.1		(1-40)
11.3		(1-40)
11.6		(1-40)

WIDE RANGE VOCABULARY TEST

Description

This is a vocabulary test which provides rapid and accurate determination of the scholastic intelligence of literate individuals. Form B presents the stimulus words in order of difficulty, while Form C has them arranged alphabetically. The range of each is from eight years through superior adult.

Summary of Item Analysis

The 100 items on each form of this test relate to Thinking and Reading objectives, but not to Listening, Speaking, Writing, and Values objectives. They relate directly to the Thinking objectives of observation/recall (1.1), and comprehension/analysis (1.2), and to the Reading objectives of focus on meaning (5.2), word recognition (6.1), and understanding of denotation (6.3). Indirectly, the 100 items relate to the Reading objectives of developing confidence in reading (4.1), understanding and enjoyment of written language (4.2), and reading a variety of materials with fluency and efficiency (5.1).

Table 27 Wide Range Vocabulary Test

ENGLISH

Code : direct / indirect

NAME OF SUBTEST	THINKING										LISTENING						SPEAKING				READING (Interests)			READING (Processers)						READING (Vocabulary)			
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.4	3.5	4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	5.6	6.1	6.2	6.3	6.4
	100	100																			100	100		100	100					100		100	

	READING (Rate)	WRITING (Skills)														WRITING (Models)			WRITING (Revising)					VALUES								
	7.1	8.1	2	3	4	5	.6	.7	.8	.9	.10	.11	.12	.13	.14	9.1	9.2	9.3	10.1	.2	.3	.4	.5	11.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE 27A

Test Analysis: Specific Items Related to Objectives

Wide Range Vocabulary Test

Forms B and C

Objective	Items
1.1	1-100
1.2	1-100
4.1	(1-100)
4.2	(1-100)
5.1	(1-100)
5.2	1-100
6.1	1-100
6.3	1-100

SUMMARY OF ITEM ANALYSES OF THE ENGLISH TESTS

All the English tests analysed are limited by their format and by considerations of scoring. Hence, the comparative analysis shows that the test items relate directly or indirectly only to those objectives of the Intermediate Division English Curriculum that can be measured by objective items on a paper and pencil test.

Some tests are grouped into batteries or series which usually include Reading Comprehension, Vocabulary, Expression and Usage (Spelling, Punctuation, and Grammar). Tests of "fast reading" or measures of reading rate occur infrequently. Among the tests analysed, there is only one Listening test. Speaking and Creative Writing skills are not measured, being excluded by the nature of the tests, as indicated above.

Among the Thinking objectives most frequently measured are observation/recall (1.1) and comprehension/analysis (1.2). Tests of Reading Comprehension tend to measure the ability to respond to questions, make inferences, and develop logical trains of thought (1.3, 1.5). Tests of Study Skills and Use of Sources relate to objectives of gathering information, assessing the relevance or credibility of evidence, and synthesizing disparate pieces of information for a purpose (1.4, 1.6, 1.7). Understanding of aspects of thinking and problem-solving processes, and of the role of the media, and development of criteria to evaluate ideas (1.8, 1.9, 1.10) are not touched upon by any of the tests analysed.

The Listening skill of developing powers of attention and concentration in listening (2.1) is tested by the items of one test only. The other Listening objectives, which deal with such aspects as sensitivity to sound and to viewpoint, with the development of interactive skills, and with discrimination regarding the media (2.2, 2.3, 2.4, 2.5, 2.6) are not dealt with at all in the tests under consideration.

Speaking objectives concerned with the ability to "articulate ideas, thoughts, and feelings with confidence and clarity" (section 3), are not touched upon by these tests, all of which, as indicated above, are paper and pencil instruments.

Reading in the English curriculum has four categories of objective: attitudes, processes, vocabulary, and rate. Most of the tests analysed touch indirectly on the development of certain attitudes, such as confidence (4.1), and the understanding and enjoyment of varieties of written language (4.2). With regard to Reading processes, most tests measure, at least indirectly, the ability to read a variety of materials with fluency and efficiency (5.1), to focus attention on meaning (5.2), to think while reading (5.4), to obtain and use information proficiently (5.5, tested mainly under the heading of Study Skills), and, to follow increasingly complex syntax and organizational patterns with fluency (5.6). Most Reading processes objectives are tested in Reading Comprehension and Vocabulary tests. The Vocabulary and Word Skills objectives of word recognition (6.1) and use of such reference works as the dictionary, encyclopedia, and thesaurus (6.2, 6.4) are touched upon mainly in Vocabulary, Study Skills, and Use of Sources subtests. The objective of demonstrating a precise understanding of the denotation, as well as interest in the connotations, of words encountered in reading (6.3) is measured directly or indirectly by most Reading Comprehension, Vocabulary, and Usage subtests. The Reading rate objective (7.1) of reading at speeds adequate for comprehension and appropriate to the purpose of reading and type of material is measured specifically by one or two tests, but also, in a more general way, by most Comprehension subtests.

One set of Writing objectives is concerned with the use of writing skills commensurate with the student's physical, intellectual, and emotional maturity. Tests of Expression and Usage (Spelling, Punctuation, and Grammar) and some tests of study skills contain items which relate to the objectives of demonstrating proficiency in spelling and punctuation and precision in language usage (8.1), demonstrating increasing competence in the use of the conventions of standard written English (8.2), developing skills of accurate observation and reporting (8.5), demonstrating a growing proficiency in collecting, organizing, and presenting information in a coherent and appropriate form (8.9), and performing with increasing precision and clarity such school language tasks as taking and making notes, writing reports, and answering examination questions (8.12). There is no testing of personal or creative writing, of application of word knowledge (8.3), or of sensitivity to qualities of language such as the colour and vigour of figurative language (8.4). Appreciation of the potential of observations and experiences for writing (8.6) and the actual writing about such observations and experiences (8.7), the joy of creativity (8.8), competence in a variety of forms of writing (8.10), adaptation of style to purpose (8.11), awareness of the usefulness of reference books on English usage (8.13), and handwriting legibility (8.14) are not measured by any tests. Of the Writing objectives concerned with recognizing and appreciating models of writing, only one is tested and that only indirectly, viz., inferring principles of language structure and usage from personal writing and literary models (9.1). There is no testing of adapting style (9.2) nor of understanding forces for and against change in usage (9.3). Several objectives concerned with recognizing the function of review, revision, and assessment in the process of improving written work are tested directly or indirectly in Language Usage tests: gaining competence in determining appropriate writing styles through editing (10.1), acquiring terminology to discuss language usage (10.4), and finding ways of discovering and describing relationships rather than rote memorization of definitions (10.5). Assessing the organization and quality of written expression (10.2) and developing increasing sensitivity to the functions of language patterns (10.3) are not touched on in any of the tests analysed.

Values objectives are not easily measured by objective testing. Indirectly, however, some tests of Reading Comprehension touch on the objectives of developing an appreciation of the role language plays in developing perception and understanding of the world (11.1), gaining, through language and literature, insight that will enable the student to build a sense of identity, purpose, self-worth, and satisfaction (11.3), and recognizing the riches that literature and language hold for

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personal growth and valuing them for their power to provide vicarious experience, to shed light on interpersonal relationships, and to extend and deepen personal awareness (11.6). The Values objectives not touched on are those concerned with developing awareness of the relationship between thought and language (11.2), growing in understanding of one's own cultural heritage within the context of Canada's multicultural society (11.4) and in understanding of persons belonging to other social and cultural groups (11.5), regarding language as a means of exploring values (11.7), seeing language media as playing a major part in lifelong learning (11.8), and recognizing the power of language and its possibilities for enriching one's life (11.9).

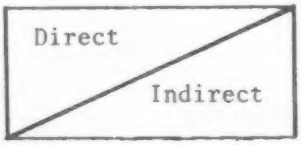
With regard to the English curriculum, then, the objectives measured by available test series and batteries are those which can be easily handled by objective-type, paper and pencil instruments. Hence, skills of recognition rather than creative abilities are focussed upon.

5 Results: Item Analysis for Science

PROCEDURE FOR ITEM ANALYSIS

The items of each standardized test were examined to determine the knowledge and skills a child would need to know in order to respond correctly to each item. The Science specialists, who did the analysis and who had helped develop the new guidelines, then asked "Which objectives in the new Science guideline would enhance the child's ability to answer the item correctly?"

Within those objectives related to a particular test item, some have far greater significance than others. However, this analysis does not attempt to give a rank ordering of the significance of related objectives. Instead, the analysis uses a bi-polar distinction between those objectives *directly* related to a test item and those objectives *indirectly* related to the same test item. The total number of items directly related to an objective are entered on the top of the diagonal and the number on the bottom of the diagonal indicates the total number of indirect items related to an objective. This format is illustrated below.



The results of the item analysis for each standardized test are tabulated in two forms. The first form is a summary chart which displays visually the general areas being measured by the test items. In the summary chart the total number of items both directly and indirectly related to the objectives are listed using the format described above.

The second form is a table which identifies by the actual number of the test item, the specific items related to each objective. In these tables, the items which are indirectly related to an objective are enclosed in brackets ( ).

SCIENCE OBJECTIVES IN THE INTERMEDIATE DIVISION

The Science objectives deal very specifically with subject matter content. The elementary section for grades 7 and 8 has 21 content topics and the secondary section for grades 9 and 10 has 23 content topics. These objectives are listed below. (Mandatory topics are listed with an asterisk *.)

Elementary - grades 7 and 8

E1 Characteristics of Living Things

E1.1 Variety of Organisms
E1.2 *Movement and Locomotion
E1.3 *Growth
E1.4 *Reproduction
E1.5 *Metabolism
E1.6 Cellular Basis of Life
E1.7 *Irritability
E1.8 Adaptation

E2 Classification of Living Things

E2.1 Need for Classification
E2.2 Classification Systems
E2.3 *Informal Biological Classification
E2.4 *Formal Biological Classification
E2.5 *Classification of Plant Specimens
E2.6 +Fungi
E2.7 +Mosses
E2.8 +Ferns
E2.9 +Seed Producers
E2.10 *Invertebrates
E2.11 *Vertebrates

+Of these topics, in this unit, at least one is mandatory

E3 Force and Energy

E3.1 Examples of Forces
E3.2 *Measurement of Forces
E3.3 *Force of Gravity
E3.4 *Force of Gravity and Its Relationship to Mass
E3.5 *Work
E3.6 *Measurement of Work
E3.7 *Energy
E3.8 Potential Energy
E3.9 Kinetic Energy
E3.10 *Forms of Energy
E3.11 *Energy Conversion
E3.12 Wise Use of Energy

E4 Interdependence of Living Things

E4.1 *Natural Communities
E4.2 *Concept of an Ecosystem
E4.3 *Types of Communities
E4.4 *Producers, Consumers, and Food Chains
E4.5 Photosynthesis and Respiration
E4.6 Biological Change
E4.7 *Disturbance of Balance
E4.8 *Human Influence

E5 Measurement

E5.1 The Need for Quantitative Description
E5.2 Physical Quantities and Their Units
E5.3 *Linear Units
E5.4 Averaging
E5.5 Rounding
E5.6 *Area Units
E5.7 *Volume Units
E5.8 *Mass Units
E5.9 *Time Units
E5.10 *Temperature Units
E5.11 Rate of Change

E6 Properties of Matter

E6.1 Description of an Object
E6.2 Description of a Single Substance
E6.3 *Properties, Functions, and Inferences
E6.4 *Qualitative and Quantitative Properties
E6.5 *Biological, Chemical, and Physical Properties
E6.6 *Diversity of Physical Properties
E6.7 *Solid, Liquid, and Gas
E6.8 *Matter
E6.9 Non-matter
E6.10 Applications of Matter Based on Properties

Optional Units (At least six optional units must be selected.)

E7 Adaptation and Behaviour

E7.1 *Inherited Behaviour
E7.2 *Tropisms and Taxes
E7.3 *Learned Behaviour
E7.4 *Protective Mechanisms
E7.5 *Body Language

E8 Astronomy

E8.1 Historical Development
E8.2 Orbital Motion
E8.3 *The Earth
E8.4 *The Moon
E8.5 *The Planets
E8.6 *The Sun
E8.7 *The Stars
E8.8 Other Celestial Bodies
E8.9 Astronomical Instruments

E9 Forestry Resources

E9.1 *Northern Boreal Forest
E9.2 *Temperate Deciduous Forest
E9.3 *Forest Products
E9.4 Forest Land Use
E9.5 Forests, Soil, and Water

E10 Heat and Temperature

E10.1 Sources of Heat

E10.2 *Expansion of Metals

E10.3 *Expansion of Water

E10.4 *Expansion of Air

E10.5 *Meaning of Temperature

E10.6 *Conduction

E10.7 *Convection

E10.8 Radiation

E10.9 *Melting of Ice

E10.10 Boiling of Water

E10.11 Kinetic Molecular Theory

E11 Life Cycles

E11.1 *Comparison of Asexual and Sexual Reproduction

E11.2 *Examples of Asexual Reproduction

E11.3 *Examples of Sexual Reproduction

E11.4 +Life Cycle of a Fern

E11.5 +Life Cycle of a Seed-Bearing Plant

E11.6 +Life Cycle of an Earthworm

E11.7 +Life Cycle of Insects

E11.8 +Life Cycle of a Frog

+Of these topics, in this unit, at least two are mandatory

E12 Light

E12.1 *Rectilinear Propagation of Light

E12.2 *Transparent, Translucent, and Opaque Materials

E12.3 *Reflection

E12.4 *Refraction

E12.5 Lenses

E12.6 The Spectrum

E13 Magnetism and Electricity

E13.1 Magnetic Substances

E13.2 *Magnetic Poles

E13.3 *Magnetic Forces

E13.4 Magnetic Fields

E13.5 Production of Magnets

E13.6 The Earth as a Magnet
E13.7 *Electric Charges
E13.8 *Electric Attraction and Repulsion
E13.9 *Electric Current
E13.10 Electric Cell
E13.11 *Electric Circuit
E13.12 Series and Parallel Components
E13.13 *Electromagnets

E14 Mining Resources

E14.1 *Why Mine?
E14.2 How to Find an Ore Body
E14.3 How to Mine an Ore Body
E14.4 *Mining Processing
E14.5 *Smelting, Converting, and Refining

E15 Plants

E15.1 Classification of Plants
E15.2 *Plant Structures
E15.3 *Flowers and Fruits
E15.4 *Seeds
E15.5 Plant Growth
E15.6 Plant Projects

E16 Rocks and Minerals

E16.1 *Differences between Rocks and Minerals
E16.2 *Rock Classification
E16.3 *Rock Formations
E16.4 Erosion and Weathering
E16.5 *Energy Fuels
E16.6 Fossil Study
E16.7 Mineral-identification Tests
E16.8 Crystal Formation
E16.9 *Metallic Minerals
E16.10 *Non-metallic Minerals
E16.11 Gem Minerals

E17 Simple Machines

E17.1 *Concept of a Machine
E17.2 *Our Use of Machines
E17.3 Simple and Complex Machines
E17.4 *Principle of Work
E17.5 *Efficiency
E17.6 Mechanical Advantage
E17.7 Concept of Friction
E17.8 Experimental Study of Friction
E17.9 Experimental Study of Levers
E17.10 *Machines in our Lives

E18 Solutions

E18.1 *Characteristics of a Solution
E18.2 *Saturated and Unsaturated Solutions
E18.3 *Supersaturated Solutions
E18.4 *Testing for Degree of Saturation
E18.5 Crystals
E18.6 *Rate of Solution
E18.7 Exothermic and Endothermic Reactions
E18.8 *Water, the Universal Solvent

E19 Water

E19.1 *The Water Cycle
E19.2 *The Physics of Water
E19.3 The Chemistry of Water
E19.4 *Water Treatment
E19.5 *Water and Living Things
E19.6 Water as a Land-changer
E19.7 Water in Weather
E19.8 *Conservation of Water

E20 Weather

E20.1 Nature of the Atmosphere
E20.2 *Physics of Air
E20.3 *Water in the Atmosphere
E20.4 *Characteristics of Precipitation
E20.5 Measuring and Recording Atmospheric Conditions

E20.6	Clouds
E20.7	Weather Forecasting
E20.8	Lightning
E20.9	Air Pollution and Weather

E21 Wise Use of Energy

E22	Locally designed unit
E23	Locally designed unit
E24	Locally designed unit

Topics within the Units for grades 9 and 10

S1 Cells and their Processes

S1.1	*Cell Discovery, Microscope
S1.2	Cell Theory
S1.3	*Cell Structure
S1.4	*Cell Physiology
S1.5	Mitosis
S1.6	Cell Differentiation
S1.7	*Cell Organization
S1.8	*Diffusion and Osmosis

S2 Chemical Change

S2.1	*Chemical Change
S2.2	*Word Equations
S2.3	Chemical Equations
S2.4	Conservation of Mass
S2.5	Balancing Chemical Equations
S2.6	Conservation of Mass and the Open System
S2.7	Qualitative Tests
S2.8	*Studies of Chemical Change

S3 Functioning Animals

S3.1	Metabolism
S3.2	*Breathing Systems
S3.3	*Gas Exchange and the Role of Oxygen
S3.4	Breathing and Health
S3.5	*Digestive System
S3.6	*Nutrition
S3.7	Food and Energy

S4 Green Plants

S4.1 Plant Community
S4.2 *Role of Green Plants
S4.3 *Photosynthesis
S4.4 Equation for Photosynthesis
S4.5 *Absorption
S4.6 Diffusion and Osmosis
S4.7 Connection
S4.8 *The Leaf
S4.9 Ecological Role of Plants
S4.10 *Humans and Plants

S5 Heat

S5.1 Thermal Expansion (Review)
S5.2 Heat Transfer (Review)
S5.3 Changes of State
S5.4 Early Theories of Heat
S5.5 Particle Nature of Matter
S5.6 *Quantity of Heat
S5.7 *The Joule
S5.8 *The Specific Heat Capacity
S5.9 Method of Mixtures with Water
S5.10 Specific Heat Capacity of Metals
S5.11 Heat of Fusion of Ice
S5.12 Heat of Vaporization of Water

S6 Measurement

S6.1 *Length
S6.2 *Speed
S6.3 Area
S6.4 *Volume
S6.5 Length, Area, and Volume
S6.6 *Mass
S6.7 Conservation of Mass
S6.8 *Mass and Volume
S6.9 Concept of Density
S6.10 *Measurement of Density
S6.11 Density Problems
S6.12 Applications of Density

S7 Populations and Communities

S7.1 *The Biosphere
S7.2 Biomes
S7.3 *Ecosystems
S7.4 *Populations and Communities
S7.5 *Producers, Consumers, and Decomposers
S7.6 *Carnivores and Herbivores
S7.7 Mutualism and Parasitism
S7.8 *Predation
S7.9 Pyramid of Numbers
S7.10 Cycles
S7.11 Succession

S8 Structure of Matter

S8.1 *Some Processes of Science
S8.2 *The Particle Theory
S8.3 *The Atomic Theory
S8.4 Ions and Conductivity
S8.5 *The Elements
S8.6 Classification
S8.7 The Periodic Table
S8.8 *Elements and Compounds

Optional Units (At least eight optional units must be selected.)

S9 Consumer Chemistry

S9.1 *Soap and a Related Problem
S9.2 *The Best Cleanser? Developing a Hypothesis
S9.3 *Designing an Experiment on Cleansing
S9.4 *Data on Soap as a Cleanser
S9.5 *Interpreting the Data on the Cleanser
S9.6 *Evaluating the "Cleanser Hypothesis"
S9.7 Generalizations Regarding the Cleanser
S9.8 Explaining the Soap Problem

S10 Continuity

S10.1 Reproduction in Plants and Animals
S10.2 *The Need for Meiosis
S10.3 *DNA and Genetic Code
S10.4 Embryology
S10.5 Human Reproductive System
S10.6 *Human Genetics
S10.7 *Mendelian Genetics
S10.8 *Chromosome Theory

S11 Electricity and Magnetism

S11.1 Electrostatics
S11.2 *Induction
S11.3 Shielding and Discharging
S11.4 Electrochemical Cells
S11.5 Electric Units
S11.6 *Electric Energy
S11.7 *Electric Circuits
S11.8 *Magnetism
S11.9 *Electromagnetism
S11.10 Electrical Energy Conversions

S12 Environmental Chemistry

S12.1 *The Energy Crisis
S12.2 Future Energy Sources
S12.3 *Air Pollution
S12.4 *Water Pollution

S13 Fungi and Simple Plants

S13.1 *Characteristics of Fungi
S13.2 *Bread Mould
S13.3 *Yeast
S13.4 Mushrooms
S13.5 Parasitic Fungi
S13.6 Lichens
S13.7 *Complex Algae
S13.8 *Mosses
S13.9 *Ferns

S14 Geometric Optics

S14.1 Sources of Light
S14.2 Transmission of Light
S14.3 Speed of Light
S14.4 *Plane Reflection
S14.5 *Curved Mirrors
S14.6 *Refraction
S14.7 Lenses
S14.8 *Dispersion and Colour

S15 Human Interaction with the Biosphere

S15.1 *The Biosphere
S15.2 *Characteristics of Humans
S15.3 *Ecology of Early and Modern Humans
S15.4 *Population Growth
S15.5 *Values and Attitudes

S16 Machines

S16.1 *Review of Machines
S16.2 +Experimental Study of a Pulley System
S16.3 +Experimental Investigations of a Machine
S16.4 +Forms in Energy in Machines
S16.5 +Electrical Project
S16.6 +Thermal Efficiency
S16.7 +The Operation of a Machine
S16.8 +Machine Problems
+Of these topics, in this unit, four are mandatory.

S17 Mechanics

S17.1 *Force
S17.2 *Gravity-mass Ratio
S17.3 Friction
S17.4 Coefficient of Friction
S17.5 *Balanced Forces
S17.6 *Unbalanced Forces
S17.7 Moment of Force, Torque
S17.8 *Work
S17.9 *Power
S17.10 Energy
S17.11 Pressure

S18 Separation of Substances

S18.1 *Direct Filtration
S18.2 *Sedimentation
S18.3 *Floc Formation
S18.4 *Simple Distillation
S18.5 *Fractional Distillation
S18.6 Fractional Crystallization
S18.7 Paper Chromatography

S19 Solutions

S19.1 *Solutions and Mixtures
S19.2 *Molecular Explanation of Dissolving
S19.3 *Concentration
S19.4 *Classes of Solutions
S19.5 *Solubility
S19.6 *Volume Change on Mixing
S19.7 Solubility of Gases in Water
S19.8 Problems in Solubility
S19.9 Effect of Solutes on Fixed Points
S19.10 Solvents

S20 Terrestrial and Aquatic Environments

S20.1 *Study of Local Environment
S20.2 *Measurement of the Abiotic Environment
S20.3 *Temperature, Rainfall, and Biomes
S20.4 Major Biomes
S20.5 *Measurement of Biotic Populations
S20.6 *Collecting of Biotic Specimens
S20.7 Comparison of Populations
S20.8 Field Experiments
S20.9 Pond and Ocean Ecology

S21 Vibrations and Waves

S21.1 Sounds We Hear
S21.2 *Vibrations: Qualitative Aspects
S21.3 *Vibrations: Quantitative Aspects
S21.4 Pendulums
S21.5 *Waves

S21.6 Speed of a Wave
S21.7 *Transmission of Sound
S21.8 Measurement of the Speed of Sound
S21.9 Some Properties of Sound Waves
S21.10 *Characteristics of Sounds
S21.11 Applications of Sound

S22 Viruses, Monerans, and Protists

S22.1 *Viruses
S22.2 *Monerans
S22.3 Cyanophytes
S22.4 *Structure and Action of Bacteria
S22.5 *Importance of Bacteria
S22.6 Bacteria in the Laboratory
S22.7 *Microbes and Disease
S22.8 *Protists

S23 Wise Use of Energy
S24 Locally designed unit
S25 Locally designed unit
S26 Locally designed unit
S27 Locally designed unit

TESTS IN SCIENCE

The 11 tests and subtests in Science which were analysed in this study are listed below:

Content Evaluation Series
Dubins Earth Science Test
Dunning-Abeles Physics Test
Iowa Tests of Educational Development
Metropolitan Achievement Test
New Cooperative Science Test
Read General Science Test
SRA Assessment Survey
Sequential Tests of Educational Progress
Stanford Achievement Test
Tests of Academic Progress

CONTENT EVALUATION SERIES

Description

The Science Tests, Form 1 booklet contains two tests--the physical science test and the earth science test--each with 40 items for grades 8 and 9. The items cover many topics which might be part of a course of study designed from the Ministry guidelines, with the notable exception of questions relating to the biological sciences. The main topics covered by these two tests are: mechanics, astronomy, heat, magnetism, rocks and minerals, solutions, weather, chemistry, atomic theory, the earth's crust, and optics.

Summary of Item Analysis

There are relatively few units in the guidelines that could be grouped as earth sciences, hence questions from the earth science subtest tend to be localized in these units. At the elementary level astronomy (Unit E8) is referenced most often. Seven items relate to the moon (E8.4) with three of these from the physical science test. Four questions from the earth science test relate directly to the earth (E8.3). Five further items relate to this unit and all are from the earth science test with three items referring (two directly) to the planets (E8.5). Nine questions, all from the earth science test, relate to rocks and minerals (E16) with seven of eleven topics in this unit being related to one or two questions. The last elementary unit in which questions from the earth science subtest tend to be concentrated is weather (E20), with nine items. Three items relate directly to characteristics of precipitation (E20.4) and two relate directly to weather forecasting (E20.7). The remaining four items relate to four different topics. Two items from the physical science test relate (one directly and one indirectly) to the nature of the atmosphere (E20.1). The physical science test has items which relate to more of the elementary units, there being only two which are referred to noticeably more than others. Six different items relate directly to force and energy (Unit E3) with a series of three questions relating to both kinetic energy (E3.9) and energy conversion (E3.11). Five items relate directly to heat and temperature (Unit E10) with convection (E10.7) and radiation (E10.8) being related to two items each. The following elementary units are not related to items in either of the two subtests: characteristics of living things (E1), interdependence of living things (E4), adaptation and behaviour (E7), life cycles (E11), mining resources (E14), and plants (E15). Clearly, most of these units relate to the biological sciences which these two subtests were not intended to cover.

Very few items from the earth sciences subtest were found to relate to the secondary units. From the physical science subtest mechanics (S17) is the most frequently referenced unit with eight directly related items. Three questions deal with energy (S17.10), while the gravity-mass ratio (S17.2) and pressure (S17.11), are each referred to by two questions, and work (S17.8) by one. Five items relate to chemical change (Unit S2), with each item relating directly to a different topic within the unit. Heat (Unit S5) is also related to five items, but three refer directly to heat transfer (S5.2). Five items relate to the structure of matter (Unit S8) with two questions directly related to the atomic theory (S8.3). The following secondary units were not related to by questions from either of the two subtests: cells and their processes (S1), functioning animals (S3), populations and communities (S7), consumer chemistry (S9), continuity (S10), environmental chemistry (S12), fungi and simple plants (S13), human interaction with the biosphere (S15), and terrestrial and aquatic environments (S20). As with the elementary division, the tests were not designed to evaluate the biological sciences.

Two items from the physical science subtest are unrelated to topics in the guidelines, and three items from the earth science subtest are unrelated. The latter three questions deal with topics usually covered in geography or geology courses.

Table 28 Content Evaluation Series

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS								E2 CLASSIFICATION											E3 FORCE AND ENERGY											
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
Physical Science																							2/	1/				3/		3/	
Earth Science											1/																				

NAME OF SUBTEST	E4 INTERDEPENDENCE								E5 MEASUREMENT											E6 PROPERTIES OF MATTER									
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
Physical Science					/1														1/					1/					
Earth Science																													

NAME OF SUBTEST	E7 ADAPTATION					E8 ASTRONOMY									E9 FORESTRY RESOURCES				
	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5
Physical Science									3/										
Earth Science								4/	4/	2/1	1/	/1	1/						1/

NAME OF SUBTEST	E10 HEAT/TEMPERATURE											E11 LIFE CYCLES								E12 LIGHT					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6
Physical Science		1/					2/	2/															1/		
Earth Science				1/																					

Table 28 Content Evaluation Series

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
Physical Science		2/		2/																														
Earth Science																																		

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	
Physical Science															1/											2/								
Earth Science	1/	1/	1/	2/	1/	1/1				1/					1/																			

NAME OF SUBTEST	E19 WATER										E20 WEATHER									E21 WISE USE OF ENERGY														
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
Physical Science											1/1				1/																			
Earth Science	1/1					1/					1/	/1		1/	3/	1/	2/																	

Table 28 Content Evaluation Series

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS								S2 CHEMICAL CHANGE								S3 ANIMALS						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7
Physical Science									1/			1/	1/	1/		1/							
Earth Science																							

NAME OF SUBTEST	S4 GREEN PLANTS										S5 HEAT												S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
Physical Science											1/	3/				/1								1/					1/					2/
Earth Science										2/																								

NAME OF SUBTEST	S7 POPULATIONS											S8 MATTER								S9 CONSUMER CHEMISTRY							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8
Physical Science													1/	2/	1/				/1								
Earth Science																											

NAME OF SUBTEST	S10 CONTINUITY								S11 ELECTRICITY/MAGNETISM										S12 ENVIRONMENTAL CHEMISTRY							
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8
Physical Science																2/										
Earth Science																										

Table 28 Content Evaluation Series

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8
Physical Science												1/			1/										
Earth Science												1/													

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
Physical Science		1/	1/					2/		2/						1/		3/	2/		1/			/1		
Earth Science																										

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
Physical Science	2/																												/1	
Earth Science																														

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
Physical Science									(2 items are not related, and 5 items use inappropriate terms.)
Earth Science									

Table 28A

Test Analysis: Specific Items Related to Objectives

Content Evaluation Series

Objective	Subtest and Item Physical Science	 Earth Science
E2.3		16
E3.4	3, 4	
E3.5	35	
E3.9	23, 24, 25	
E3.11	23, 24, 25	
E5.11	37	
E6.5	11	
E8.3		13, 14, 15, 20
E8.4	3, 4, 5	4, 10, 31, 40
E8.5		19, 21, (39)
E8.6		3
E8.7		(32)
E8.8		39
E9.5		35
E10.2	28	
E10.4		27
E10.7	8, 9	
E10.8	9, 38	
E12.4	33	
E13.2	18, 19	
E13.4	18, 19	
E16.1		7
E16.2		36
E16.3		29
E16.4		2, 11
E16.5		38
E16.6		6, (16)
E16.10		17
E17.2	31	2
E18.1	13, 36	
E19.1		5, (33)

Objective	Subtest and Item	
	Physical Science	Earth Science
E19.6		35
E20.1	1, (6)	8
E20.2		(30)
E20.4		9
E20.5	1	24, 26, 28
E20.6		1
E20.7		12, 37
S2.1	16	
S2.4	40	
S2.5	7	
S2.6	27	
S2.8	26	
S4.10		22, 23
S5.1	28	
S5.2	8, 9, 38	
S5.6	(14)	
S6.2	37	
S6.7	22	
S6.12	2, 30	
S8.2	34	
S8.3	15, 39	
S8.4	10	
S8.8	(6)	
S11.8	18, 19	
S14.3	20	32
S14.6	33	
S16.2	31	
S16.3	12	
S16.8	12, 17	
S17.2	3, 4	
S17.8	35	
S17.10	23,24,25	
S17.11	29,32	
S18.2	2	
S18.5	(6)	
S19.1	6, 36	
S21.10	(14)	
Not related	21	
Inappropriate terminology	8, 9, 20, 23, 30	18, 25, 34

DUBINS EARTH SCIENCE TEST

Description

The Dubins Earth Science Test measures the extent to which important educational objectives of a typical earth science course have been attained by students in grades 8 through 12. Four major content areas are defined with subtopics.

The appropriateness of each objective and topic measured by the test was determined according to the frequency of its inclusion in current science education materials. Widely used textbooks of various publishers, representative courses of study, publications of educational and scientific societies, recommendations by notable experts in the field of science education, and pronouncements of national and state committees were all taken into consideration in the selection of items and in the distribution of content.

Summary of Item Analysis

Items from this test are largely concentrated in three units at the elementary level. Astronomy (Unit E8) is related to 16 different items. Four relate directly to orbital motion (E8.2), and the following are related to three items each: the earth (E8.3), the planets (E8.5), and the sun (E8.6). Only the historical development (E8.1) and astronomical instruments (E8.9) are unrelated to any items in the test. Rocks and minerals (E16) is also related to 16 different items. Seven relate (six directly) to rock classification (E16.2), four relate directly to rock formation (E16.3), and three relate directly to fossil studies (E16.6). Other topics in this unit are referenced with less frequency. The weather (Unit E20) is related to 11 different items, five of which directly concern measuring and recording atmospheric conditions (E20.5). The other items are distributed over five more topics within this unit. Most elementary units which relate to the physical and biological sciences were not referenced by items from this test. In addition, forestry resources (Unit E9) and mining resources (Unit E15) were not related to any items.

The lack of questions relating to units in the secondary panel reflect the few units at this level which relate to the earth sciences. Three items relate indirectly to temperature, rainfall, and biomes (S20.3), and three questions refer (two directly) to density (S6.12). No items could be related to environmental chemistry (Unit S12) or human interaction with the biosphere (S15) and, of course, most units relating to the physical and biological sciences were not related to.

Nine items could not be related to any topic in the intermediate science guidelines. Most of these items related to topics usually covered in geography or geology courses.

Table 29 Dubins Earth Science Test

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS								E2 CLASSIFICATION											E3 FORCE AND ENERGY											
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
																						1/									

NAME OF SUBTEST	E4 INTERDEPENDENCE								E5 MEASUREMENT											E6 PROPERTIES OF MATTER									
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10

NAME OF SUBTEST	E7 ADAPTATION					E8 ASTRONOMY									E9 FORESTRY RESOURCES				
	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5
							4/	2/1	2/	3/	3/	2/	1/						

NAME OF SUBTEST	E10 HEAT/TEMPERATURE											E11 LIFE CYCLES								E12 LIGHT					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6
							/1	/1																	

Table 29 Dubins Earth Science Test

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY													E14 MINING					E15 PLANTS					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6

NAME OF SUBTEST	E16 ROCKS/MINERALS											E17 MACHINES										E18 SOLUTIONS							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8
		6/1	4/	/1		3/	2/	/1	/1																				

NAME OF SUBTEST	E19 WATER								E20 WEATHER									E21 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	
			/1			3/	/1		1/1		/1	1/1	5/	1/	/1			

Table 29 Dubins Earth Science Test

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS										S2 CHEMICAL CHANGE										S3 ANIMALS															
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7									

NAME OF SUBTEST	S4 GREEN PLANTS											S5 HEAT													S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10		.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12		.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
													/1																							2/1

NAME OF SUBTEST	S7 POPULATIONS													S8 MATTER										S9 CONSUMER CHEMISTRY												
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8					

NAME OF SUBTEST	S10 CONTINUITY										S11 ELECTRICITY/MAGNETISM														S12 ENVIRONMENTAL CHEMISTRY											
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10					.1	.2	.3	.4								

Table 29 Dubins Earth Science Test

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS											S14 GEOMETRIC OPTICS											S15 INTERACTION WITH BIOSPHERE													
	.1	.2	.3	.4	.5	.6	.7	.8	.9			.1	.2	.3	.4	.5	.6	.7	.8				.1	.2	.3	.4	.5									

NAME OF SUBTEST	S16 MACHINES										S17 MECHANICS												S18 SUBSTANCE SEPARATION												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7						

NAME OF SUBTEST	S19 SOLUTIONS												S20 TERRESTIAL AND AQUATIC ENVIRONMENTS											S21 VIBRATIONS AND WAVES												
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	.9			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11		
															/3																					

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS																S23 WISE USE OF ENERGY																			
	.1	.2	.3	.4	.5	.6	.7	.8																												
									(12 items - inappropriate terms; 9 items - not related)																											

Table 29A

Test Analysis: Specific Items Related to Objectives

Dubins Earth Science Test

Objective	Subtest	Item
	Earth Science	
E3.3		6
E8.2		15, 29, 42, 45
E8.3		30, 57, (43)
E8.4		31, 45
E8.5		2, 16, 28
E8.6		31, 32, 59
E8.7		47, 56
E8.8		33
E10.7		(35)
E10.8		(27)
E16.2		3, 10, 11, 12, 38, 44, (39)
E16.3		1, 4, 51 , 19
E16.4		(58)
E16.6		4, 5, 58
E16.7		7, 8
E16.8		(8)
E16.9		(39)
E19.3		(48)
E19.6		34, 36, 40
E19.7		(35)
E20.1		54, (55)
E20.3		(26)
E20.4		(26), 60
E20.5		20, 21, 22, 23, 46
E20.6		25
E20.7		(43)
S5.2		(27)
S6.12		13, 15, (14)
S20.3		(21), (22), (23)
Not related		9,24,18,37,41,42,50,53,49
Inappropriate Terminology		5,6,13,14,21,22,23,26,41,42,60

DUNNING-ABELES PHYSICS TEST

Description

This test measures the extent to which important educational objectives have been attained by students in typical high school physics courses. Although these objectives may be defined in many different ways, Bloom and others have suggested that the majority of classroom goals may be classified as belonging to either the cognitive or affective domain. The cognitive objectives include the acquisition and retention of knowledge, and the development of intellectual abilities and skills. Objectives in the affective domain include attitudes, appreciations, and value judgments.

Three major cognitive categories--knowledge, comprehension, and application--were considered by the authors to be broad enough in scope to encompass the important measurable objectives commonly found in high school physics.

Certain objectives, notably those in the affective domain, do not readily lend themselves to direct measurement by means of an objective test. The assessment of these intangible attributes must often depend upon informal observation of overt behaviour of students in unstructured classroom, laboratory, or field situations. However, although no items in the Dunning-Abeles test attempt to deal directly with affective types of objectives, the skills and competencies required to answer many of the items do involve an application of a large number of relevant attitudes, appreciations, and value judgments.

The appropriateness of each objective and topic measured by the test was determined according to the frequency of its inclusion in current science education materials. Widely-used textbooks of various publishers, representative courses of study, publications of educational and scientific societies, recommendations by notable experts in the field of science education, and pronouncements of national and state committees were all taken into consideration in the selection of items and in the distribution of content.

The Dunning-Abeles Physics Test is intended for use by senior physics students and would have limited application to secondary division students and only a very few items might be answered by elementary division students. For example, objectives S2.4, Conservation of Mass, and S2.5, Balancing Chemical Equations, are indirectly related to question 5, which deals with conservation of nucleons. Most students would not encounter nuclear reactions before grade 11 and so question 5 would be unsuitable for most intermediate division students.

Summary of Item Analysis

As noted in the description of this test, intermediate level science students would find those items which can be related to topics in the guidelines difficult. Any items which are used would be more appropriate for students taking an enriched course of study.

At the elementary level, four questions related directly to force and energy (Unit E3): one item relating to force of gravity (E3.3), one to work (E3.5), two to potential energy (E3.8) and one of those items also related to kinetic energy (E3.9) and indirectly to energy conversion (E3.11). Four questions related to light (Unite E12): one item related indirectly to rectilinear propogation of light (E12.1), and directly to reflection (E12.3); two items related indirectly to refraction, and one item related directly to lenses (E12.5). Three items related to the unit on magnetism and electricity: one item related indirectly to production of magnets (E13.5) and directly to electromagnets (E13.13); one item related directly to electric attraction and repulsion (E13.8) and another related indirectly to electric current (E13.9). The only physical science topics in the elementary panel which could not be related to the items in this test were measurement (E5), astronomy (E8), simple machines (E17), and solutions (E18).

For the secondary panel eight items related to electricity and magnetism (Unit S11). One related indirectly to electric units (S11.5) and the remainder related directly to the following topics: two to electrostatics (S11.1), three to electric circuits (S11.7), and one to electromagnetism (S11.9). Six items related to geometric optics (Unit S14). One item related directly to dispersion and colour (S14.8) and indirectly to refraction (S14.6) and refraction was also related to directly by three more items. Three items (one directly and two indirectly) related to atomic theory (S8.3). Physical science units not referred to by questions at the secondary level by this test are consumer chemistry (S9), environmental chemistry (S12), machines (S16) and solutions (S19). As the title of this test would imply, no items were found which could be related to any of the biological sciences units in the intermediate division.

The 22 items in this test that do not relate to any of the topics in the Intermediate guidelines would relate to physical science topics at the grade 11 or 13 level.

Table 30 Dunning-Abeles Physics Test

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS										E2 CLASSIFICATION													E3 FORCE AND ENERGY												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	
																										1/		1/			2/	1/		/1		

NAME OF SUBTEST	E4 INTERDEPENDENCE										E5 MEASUREMENT													E6 PROPERTIES OF MATTER												
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			
																												/1					1/			

NAME OF SUBTEST	E7 ADAPTATION								E8 ASTRONOMY												E9 FORESTRY RESOURCES															
	.1	.2	.3	.4	.5				.1	.2	.3	.4	.5	.6	.7	.8	.9				.1	.2	.3	.4	.5											

NAME OF SUBTEST	E10 HEAT/TEMPERATURE														E11 LIFE CYCLES											E12 LIGHT										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11				.1	.2	.3	.4	.5	.6	.7	.8				.1	.2	.3	.4	.5	.6					
				1/	1/																					/1		1/	/2	1/						

Table 30 Dunning-Abeles Physics Test

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS										S2 CHEMICAL CHANGE											S3 ANIMALS														
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8				.1	.2	.3	.4	.5	.6	.7								
														/1	/1																					

NAME OF SUBTEST	S4 GREEN PLANTS											S5 HEAT													S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10		.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12		.1	.2	.3	.4	.5	.6		.8	.9	.10	.11	.12
														/1			2/																		1/	

NAME OF SUBTEST	S7 POPULATIONS													S8 MATTER										S9 CONSUMER CHEMISTRY												
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8					
																1/2																				

NAME OF SUBTEST	S10 CONTINUITY										S11 ELECTRICITY/MAGNETISM														S12 ENVIRONMENTAL CHEMISTRY											
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10					.1	.2	.3	.4								
											2/				/1		4/		1/																	

Table 30 Dunning-Abeles Physics Test

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
					/1			1/	/1				1/																					

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	

NAME OF SUBTEST	E19 WATER										E20 WEATHER											E21 WISE USE OF ENERGY												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															

Table 30 Dunning-Abeles Physics Test

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
													1/		3/1	1/	1/					

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
									1/							1/										

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
									(22 items - not related; 5 items - inappropriate terms)

Table 30A

Test Analysis: Specific Items Related to Objectives

Dunning-Abeles Physics Test

Objective	Subtest	Item
	Physics	
E3.3		12
E3.5		8
E3.8		21, 22
E3.9		21
E3.11		(21)
E6.5		(1)
E6.10		1
E10.4		9
E10.5		11
E12.1		(6)
E12.3		6
E12.4		(43), (44)
E12.5		40
E13.5		(7)
E13.8		33
E13.9		(27)
E13.13		7
S2.4		(5)
S2.5		(5)
S5.3		(41)
S5.6		41, 42
S6.11		25
S8.3		2, (1), (5)
S11.1		20, 33
S11.5		(10)
S11.7		34, 35, 36, 39
S11.9		7

Objective	Subtest	Item
	Physics	
S14.4		6
S14.6		16, 43, 44, (32)
S14.7		40
S14.8		32
S17.1		4
S17.8		8
Not related		3, 13, 14, 15, 17, 18, 19, 23, 24, 26, 28, 29, 30, 31, 37, 38, 45, 46, 47, 48, 49, 50
Inappropriate terminology		5, 8, 20, 23, 28

IOWA TESTS OF EDUCATIONAL DEVELOPMENT

Description

Thirty background questions combined with 18 reading exercises based on science experiments yield the total science score. Together, these exercises are designed to survey the student's general achievement in science. Only the background questions were matched to the science objectives in the following study.

The background questions provide a brief assessment of student understanding of a number of important facts, principles, applications, and generalizations drawn from the biological, physical, and earth sciences. Some exercises also touch on the methods of scientific inquiry. As in the social studies background test, subject matter is not restricted to that introduced in specific high school courses. Relatively few questions deal with ideas so technical that insight could be attained *only* by intensive course work in the sciences. The test questions tend, rather, to emphasize understanding and appreciation of common phenomena which might be gained through schoolwork and experience outside school

It should be recognized that this test was not intended to provide comprehensive measurement of science achievement in the several disciplines. Although it can be used to rank students in their overall development in the sciences with reasonable accuracy, specific measurement would call for a far greater number of questions on a much narrower range of content.

Summary of Item Analysis

All 30 items in the ITED science subtest are related to topics in the intermediate guidelines. In the elementary division, four different items relate to astronomy (Unit E8): one item relates directly to three different topics--orbital motion (E8.2), the earth (E8.3), and the moon (E8.4). A second item refers directly to orbital motion, a third refers indirectly to the earth, and the fourth item relates indirectly to the sun (E8.6). Two of three items relating to properties of matter (Unit E6) concern (one directly and one indirectly) solids, liquids, and gases (E6.7), and the third item relates directly to properties, functions, and inferences (E6.3). The following elementary units are not related to by any items: classification of living things (E2), measurement (E5), forestry resources (E9), mining resources (E14), and simple machines (E17).

At the secondary level, three items refer to scientific statements and experiments. These questions are broad in their scope and have been classified as relating to some processes of science (S8.1) although they could be used at the conclusion of any unit of study that includes experimental work. Two items relate directly to the unit structure of matter (S8), one dealing with the particle theory (S8.2), and the second refers to elements and compounds (S8.8). Mechanics (Unit S17) has three items. Two relate directly to unbalanced forces (S17.6) and one relates indirectly to energy (S17.10). The following secondary units are not related to any items in the ITED science subtest: cells and their processes (S1), populations and communities (S7), consumer chemistry (S9), environmental chemistry (S12), fungi and simple plants (S13), machines (S16), solutions (S19), and terrestrial and aquatic environments (S20).

Table 31 Iowa Tests of Educational Development

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS										E2 CLASSIFICATION													E3 FORCE AND ENERGY												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	
					1/			1/																/1						/1						

NAME OF SUBTEST	E4 INTERDEPENDENCE										E5 MEASUREMENT													E6 PROPERTIES OF MATTER												
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			
		1/			1/			1/																		1/				1/1						

NAME OF SUBTEST	E7 ADAPTATION								E8 ASTRONOMY												E9 FORESTRY RESOURCES															
	.1	.2	.3	.4	.5				.1	.2	.3	.4	.5	.6	.7	.8	.9				.1	.2	.3	.4	.5											
				1/						2/	1/1	1/		/1																						

NAME OF SUBTEST	E10 HEAT/TEMPERATURE														E11 LIFE CYCLES											E12 LIGHT										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11				.1	.2	.3	.4	.5	.6	.7	.8				.1	.2	.3	.4	.5	.6					
											1/1								/1										1/							

Table 31 Iowa Tests of Educational Development

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
	1/							1/	/1																	1/	1/							

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	
									1/																	1/								

NAME OF SUBTEST	E19 WATER										E20 WEATHER											E21 WISE USE OF ENERGY											
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
		/1				1/					1/																							

Table 31 Iowa Tests of Educational Development

GRADES 9 AND 10 – SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS								S2 CHEMICAL CHANGE								S3 ANIMALS						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7
									2/								1/		/1				

NAME OF SUBTEST	S4 GREEN PLANTS										S5 HEAT												S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
									1/				1/																		/1			

NAME OF SUBTEST	S7 POPULATIONS											S8 MATTER								S9 CONSUMER CHEMISTRY							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8
												3/	1/														

NAME OF SUBTEST	S10 CONTINUITY								S11 ELECTRICITY/MAGNETISM										S12 ENVIRONMENTAL CHEMISTRY			
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4
			/1					/1		1/						1/						

Table 31 Iowa Tests of Educational Development

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
															1/				1/			

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
														2/				/1					1/			

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
																										1/				

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
							1/		(1 item - not related; 1 item - inappropriate terms)

Table 31A

Test Analysis: Specific Items Related to Objectives

Iowa Tests of Educational Development

Objective	Subtest	Item
	Science	
E1.5		2
E1.8		2
E3.1		(15)
E3.7		(14)
E4.2		29
E4.5		29
E4.8		3
E6.3		19
E6.7		20, (16)
E7.4		2
E8.2		12, 18
E8.3		12, (25)
E8.4		12
E8.6		(28)
E10.11		20, (16)
E11.5		(8)
E12.4		23
E13.1		6
E13.8		6
E13.9		(19)
E15.4		8
E15.5		13
E16.9		11
E18.1		24
E19.2		(7)
E19.6		7
E20.1		25
S2.1		5, 30
S3.1		2
S3.3		(2)
S4.9		29

Objective	Subtest	Item
	Science	
S5.3		20
S6.9		(25)
S8.1		1, 16, 22
S8.2		9
S8.8		27
S10.3		(21)
S10.8		(21)
S11.2		6
S11.8		6
S14.6		23
S15.2		17
S17.6		4, 15
S17.10		(14)
S18.4		24
S21.7		10
S22.7		26
Inappropriate terminology		15

METROPOLITAN ACHIEVEMENT TESTS--ADVANCED BATTERY

Description

Metropolitan Achievement Tests are a series of measures designed to tell teachers and administrators how much pupils have learned in important content and skill areas of the school curriculum. The tests are basically a source of information yielding comparable measures from one level to another and one subject to another. These features help educators in evaluating pupil progress over the years and in identifying particular strengths and weaknesses. More specifically, the tests, including supplementary interpretive materials, are designed (1) to help teachers plan for instruction based on pupils' needs and differences and to evaluate the effects of previous instruction; and (2) to help administrators assess schoolwide progress towards educational goals and to plan for and evaluate curricular changes.

The test contents are based on careful and extensive analyses of contemporary textbooks, syllabuses, and other curricular sources.

The Science tests consist of 80 items which measure pupils' knowledge and use of scientific concepts, facts, and skills. Items cover plant and animal biology, human health and safety, chemistry, magnetism and electricity, energy and machines, sound, light, heat, weather and climate, earth science, astronomy, and history and methodology of science.

Summary of Item Analysis

The items which comprise the Metropolitan Achievement Tests cover a broad spectrum of the biological and physical sciences. Ten items relate directly to informal biological classification (E2.3) and nine items relate directly to forms of energy (E3.10). Nine items relate to astronomy (Unite E8) as follows: one directly and two indirectly to the earth (E8.3), two directly to the moon (E8.4), one to the stars (E8.7), and three (two directly, one indirectly) to other celestial bodies. Five items relate to weather (Unit E20): one directly and one indirectly to the nature of the atmosphere (E20.1), one indirectly to characteristics of precipitation (E20.4), and two directly to measuring and recording atmospheric conditions (E20.5).

In the elementary division, no questions were found in this test which could be related to the following units: characteristics of living things (E1), interdependence of living things (E4), adaptation and behaviour (E7), life cycles (E11), plants (E15), or solutions (E18).

In the secondary division, five different items relate directly to structure of matter (Unit S8). Three related to both the elements (S8.5) and to elements and compounds (S8.8), with another two items relating to the latter topic. Four items related directly to electricity and magnetism (Unit S11): two each to electric energy (S11.6) and to magnetism (S11.8). Four items related to geometric optics (Unit S14): one related directly to plane reflection (S14.4), while sources of light (S14.1), lenses (S14.7), and dispersion and colour (S14.8) were related to indirectly by one question each. Four items related to mechanics (S17): one directly, and one indirectly to force (S17.1) and one each related directly to the gravity-mass ratio (S17.2) and pressure (S17.11).

Fourteen of the eighty items in this test could not be related to any of the topics. Eight were concerned with human physiology, five to drawing inferences from a graph and one to the earth's mantle.

Table 32 Metropolitan Achievement Tests--Advanced Battery

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS										E2 CLASSIFICATION													E3 FORCE AND ENERGY												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	
													10/		1/									1/1			1/						9/			

NAME OF SUBTEST	E4 INTERDEPENDENCE										E5 MEASUREMENT													E6 PROPERTIES OF MATTER												
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			
													2/															/1								

NAME OF SUBTEST	E7 ADAPTATION								E8 ASTRONOMY												E9 FORESTRY RESOURCES															
	.1	.2	.3	.4	.5				.1	.2	.3	.4	.5	.6	.7	.8	.9				.1	.2	.3	.4	.5											
											1/2	2/			1/	2/1								1/	2/											

NAME OF SUBTEST	E10 HEAT/TEMPERATURE														E11 LIFE CYCLES											E12 LIGHT										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11				.1	.2	.3	.4	.5	.6	.7	.8				.1	.2	.3	.4	.5	.6					
		1/																										1/		/1						

Table 32 Metropolitan Achievement Tests--Advanced Battery

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
	/1	1/	1/	1/							1/						/2																	

NAME OF SUBTEST	E16 ROCKS/MINERALS												E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	
					/1	2/								/1	/1																			

NAME OF SUBTEST	E19 WATER										E20 WEATHER												E21 WISE USE OF ENERGY											
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
	1/1					/1	/1				1/1			/1	2/																			

Table 32 Metropolitan Achievement Tests--Advanced Battery

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS								S2 CHEMICAL CHANGE								S3 ANIMALS						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7
									1/1							1/		/1			2/		

NAME OF SUBTEST	S4 GREEN PLANTS										S5 HEAT												S6 MEASUREMENT										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.1	.2	.3	.4	.5	.6	.8	.9	.10	.11	12
			1/								1/												/2										

NAME OF SUBTEST	S7 POPULATIONS											S8 MATTER								S9 CONSUMER CHEMISTRY							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8
																3/			5/								

NAME OF SUBTEST	S10 CONTINUITY								S11 ELECTRICITY/MAGNETISM										S12 ENVIRONMENTAL CHEMISTRY			
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4
			/1					/1						2/		2/						

Table 32 Metropolitan Achievement Tests--Advanced Battery

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
										/1			1/			/1	/1		2/			

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
	1/1								1/1	1/									1/	1/						

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
																											1/			

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
	1/						1/	2/	(14 items - not related; 8 items - inappropriate terms)

Table 32A

Test Analysis: Specific Items Related to Objectives
Metropolitan Achievement Tests
Advanced Battery: Grades 7, 0 - 9, 5

Objective	Subtest	Item
	Science	
E2.3		36-45
E2.5		44
E3.1		69, (67)
E3.4		62
E3.10		27-35
E5.3		79, 80
E6.5		(61)
E8.3		75, (5), (76)
E8.4		59,62
E8.7		66
E8.8		2, 7, (37)
E9.4		57
E9.5		57,70
E10.2		72
E12.3		52
E12.5		(53)
E13.1		(56)
E13.2		56
E13.3		71
E13.4		56
E13.11		27
E14.2		(4),(11)
E16.5		(10)
E16.6		40,58
E17.1		(73)
E17.2		54
E19.1		(8),65
E19.6		(70)
E19.7		(65)
E20.1		(1),39
E20.4		(6)
E20.5		3,9

Objective	Subtest	Item
	Science	
S2.1		60, (64)
S2.8		60
S3.2		(73)
S3.5		14, 17
S4.3		41
S5.1		72
S6.1		(79), (80)
S8.5		46, 47, 49
S8.8		46-50
S10.3		(45)
S10.8		(45)
S11.6		27, 31
S11.8		56, 71
S14.1		(35)
S14.4		52
S14.7		(53)
S14.8		(32)
S15.2		55, 68
S16.1		54, (73)
S17.1		(67), 69
S17.2		62
S17.11		63
S18.1		38
S21.8		74
S22.1		51
S22.7		51
S22.8		41, 43
Not related		11, 12, 13, 15, 16, 18, 19, 20, 21 22-26
Inappropriate terminology		34, 63, 77, 78, and table for 77-80

COOPERATIVE SCIENCE TESTS

Description

These tests measure achievement in four major areas of the junior-senior high school science curriculum: general science, biology, chemistry, and physics. Achievement is assessed in terms of knowledge and understanding of basic concepts and principles, ability to apply knowledge in problem situations, and ability to analyse and evaluate scientific ideas and procedures.

Two general science tests in the series provide flexibility in meeting the measurement needs of various types of junior high school programs. The general content specifications of the two tests are similar, with about one-fourth of each test devoted to biology, chemistry, and physics, respectively. The remaining fourth of each test draws upon astronomy, geology, and meteorology. The General Science test is a brief survey of elementary concepts in these subject areas, and is appropriate for most introductory science courses in grades 7, 8, or 9. The longer Advanced General Science test provides more intensive and comprehensive treatment of the content at a somewhat higher level of difficulty and is appropriate for most grade 9 general science courses. This test is also suitable for students of average or higher ability who are completing general science at the grade 8 level.

The Biology, Chemistry, and Physics tests measure the outcomes of typical high school courses in these subjects. Each test has two parts, either of which may be administered singly. Part I of the Biology test deals with human biology and the general structure, characteristics, and processes of living things. Part II is devoted primarily to plant and animal forms. Part I of the Physics and Chemistry tests surveys basic concepts and principles of the subject. Part II tests the ability to apply knowledge in practical laboratory situations and measures understanding of scientific methods and procedures.

Summary of Item Analysis

There are five tests in this series, with all but one having two subtests. Each of the five tests are considered separately in the following discussion.

General Science

This is the only test in the series which does not have two subtests. Items cover many units, but the unit on properties of matter (E6) has the biggest concentration of questions. Five items relate directly to properties, functions, and inferences (E6.3) and seven questions relate directly to biological, chemical, and physical properties (E6.5). Five items deal with magnetism and electricity (Unit E13), with three relating (two indirectly) to series and parallel components (E13.12) while electric circuits (E13.11) and electromagnets (E13.13) are directly related to one item each. Five questions relate directly to rocks and minerals (Unit E16). A series of four items refer to fossil study (E16.6) and one question relates to erosion and weathering (E16.4). Unit E19, water, is directly referenced by five items. Three relate to the water cycle (E19.1), while the physics of water (E19.2) and water treatment (E19.4) are related to one question each. Four items relate (three directly) to the single topic on characteristics of a solution (E18.1). The following elementary units were not related to items in this test: characteristics of living things (E1), classification of living things (E2), forestry resources (E9), life cycles (E11), light (E12), mining resources (E14), plants (E15), and simple machines (E17).

The secondary unit which has the most items relating to it is chemical change (S2) with ten items relating (five directly) to studies of chemical change (S2.8). Eight questions relate directly to microbes and disease (S22.7) and one item relates indirectly to the importance of bacteria (S22.5) in the unit on viruses, monerans, and protists (S22). Electricity and magnetism (Unit S11) is directly related to six items.

A series of four questions relates to electric circuits (S11.7), while electromagnetism (S11.9) and electric energy conversions (S11.10) are each directly related to single items. A series of four questions deals directly with the single topic solutions and mixtures (S19.1). Secondary units not referred to by items from this test are: cells and their processes (S1), populations and communities (S7), structure of matter (S8), consumer chemistry (S9), continuity (S10), environmental chemistry (S12), fungi and simple plants (S13), geometric optics (S14), machines (S16), separation of substances (S18), terrestrial and aquatic environments (S20), and vibrations and waves (S21). Only three items from the general science test could not be related to topics in the intermediate guidelines.

Advanced General Science

The advanced general science subtest is composed of two tests labelled I and II in the following discussion. At the elementary division there are three units which each account for thirteen or more different items. The largest concentration is on properties of matter (Unit E6) with eighteen different items relating to it. Four questions from test I relate directly to description of an object (E6.1) and a single item from test II relates directly to properties, functions, and inferences (E6.3). Eight different items relate directly to biological, chemical, and physical properties (E6.5), with five of these from test I. Two items from test II relate directly to the diversity of physical properties (E6.6) and two items from test I relate indirectly to this topic. Four questions from test II relate directly to solids, liquids, and gas (E6.7), although two questions also related to the previous topic, and one also related to E6.3. Also referenced many times is weather (Unit E20) with seventeen different items. Six of eight items from test I relate directly to the nature of the atmosphere (E20.1), and two questions from test II relate to this topic. One of these items from test I also relates directly to physics of air (E20.2) and another also relates directly to measuring and recording atmospheric conditions (E20.5). Three items from test II also refer directly to the latter topic though two of these also related to E20.1. Three questions from test II relate directly to E20.2, while water in the atmosphere (E20.3) is directly related to one item from each test. Weather forecasting (E20.7) is directly related to two items from test I, one of these questions having also related to E20.1 and E20.2. One question from test I relates directly to air pollution and weather (E20.9). The third large unit is astronomy (E8) with thirteen different items, all relating directly and all from test I. Seven questions pertain to the stars (E8.7), four to the earth (E8.3) and three topics are referred to by one question each: the planets (E8.5), the sun (E8.6), and astronomical instruments (E8.9). Units with somewhat fewer questions relating to them are magnetism and electricity (E13) with six different items all from test II, rocks and minerals (E16) also with six different items but all from test I, and water (E19) with eight different items, seven of which are from test I. The following elementary units are not related to items in the advanced general science tests: interdependence of living things (E4), measurement (E5), life cycles (E11), light (E12), and mining resources (E14).

At the secondary level, ten questions refer to viruses, monerans, and protists (Unit S22), all from test I. Five relate (three indirectly) to microbes and disease (S22.7), three refer (two directly) to the importance of bacteria (S22.5), and two relate directly to monerans (S22.2). Unit S2, chemical change, is directly related to eight items all from test II. Four relate to studies of chemical change (S2.8), three to qualitative tests (S2.7), and one refers to chemical change (S2.1). Eight items relate to functioning animals (Unit S3) and all are from test I. Four of five items relating to the digestive system do so directly, two questions relate directly to gas exchange and the role of oxygen (S3.3). Eight questions, all from test II, are concerned with heat (Unit S5). Five items relate directly to changes of state (S5.3), one relates indirectly to the particle nature of matter (S5.5), while thermal expansion (S5.1) and heat transfer (S5.2) are directly related to one question each. Test II provides seven different items which all relate directly to the structure of matter (S8). Four items refer to some processes of science (S8.1) and three relate to the atomic theory (S8.3) with two items in common with S8.1. The elements (S8.5) and the periodic table (S8.7) are related to one item each. Three units are each referenced by six different items each: electricity and magnetism (S11), all relating directly and from test II; mechanics (S17) with five relating directly and all items again from test II, and solutions (S19), again with five direct items and all six questions from test II. The following secondary units were not related to items from the advanced general science test: cells and their processes (S1), populations and communities (S7), consumer chemistry (S9), continuity (S10) environmental chemistry (S12), geometric optics (S14), and terrestrial and aquatic environments (S20).

Four items from the advanced general science test II were unrelated to any topics in the intermediate guidelines.

Biology

There are three elementary units which can be related to by more items from the two biology tests than any others. Fourteen different items relate to the classification of living things (Unit E2) and all are from test II. Five items relate directly to informal biological classification (E2.3), and another five to seed producers (E2.9). Four items relate directly to vertebrates (E2.11). Plants (Unit E15) are also referred to by fourteen different items. Seven (six are from test II) items relate directly to seeds (E15.4). Four questions (three are from test II) relate directly to plant growth (E15.5), two items from test I refer (one directly and one indirectly) to plant structures (E15.2), and one item from test II relates directly to flowers and fruits (E15.3). The third unit to draw many questions concerns life cycles (E11) with thirteen different items which relate directly, all but one coming from test II. Twelve questions (11 from test II) relate to the life cycle of a seed-bearing plant (E11.5). One item relates directly to the life cycles of insects (E11.7) and of frogs (E11.8). Unit E1, characteristics of living things, is directly related to seven items, five of which are from test I. Adaptation and behaviour (Unit E7) is directly related to six items, four of which are found in test I. The only biological science elementary unit not related to by any item from these tests is forestry resources (Unit E9).

At the secondary level there are three units which are related to many more times than others. Functioning animals (S3) is referred to by 21 different items, fifteen of which come from test I. These twenty-one items are distributed over the following topics: metabolism (S3.1), one direct item in test I; breathing systems (S3.2), four direct items in test II and one indirect from test I; gas exchange and the role of oxygen

(S3.3), two direct items from test I; the digestive system (S3.5), with seven items from test I (six are directly related) and one indirect question from test II; nutrition (S3.6) accounts for five items, with four (three are indirect) from test I and one indirect item from test II. Green plants (Unit S4) is the second unit with many questions relating to it, a total of 18 different items. Nine items relate to photosynthesis (S4.3) with eight (seven are direct) from test II. Four items from test I relate directly to diffusion and osmosis (S4.6). Two questions from test II relate directly to the leaf (S4.8) and a third item relates to the ecological role of plants (S4.9). This latter item is in test II and also relates to photosynthesis and the role of green plants (S4.2); a second item from test II also relates to the latter topic. Finally for this unit, one item from each test relates to absorption (S4.5). Continuity (Unit S10) is related to fifteen different items, with eight from test II, all relating directly to reproduction in plants and animals (S10.1). Six items from test I relate directly to Mendelian genetics (S10.7) and one item relates to chromosome theory (S10.8). Six items relate directly to viruses, monerans, and protists (Unit S22) and all are from test I; five items refer to microbes and disease (S22.7). The only secondary unit which pertains to the biological sciences that is unrelated to items in the biology subtests is S15, human interaction with the biosphere.

A total of 15 items from test I were unrelated to topics in the intermediate guidelines. Of these, 13 deal with, or are related to, the human body. Five items from test II are unrelated to any topics.

Chemistry

Few items from the chemistry tests can be related to elementary units. For example, four items relate directly to solutions (Unit E18). Two refer to saturated and unsaturated solutions (E18.2) and both are from test II, while one item from each test relates to crystals (E18.5). But this represents the greatest concentration of questions in the elementary panel from these tests because there are few chemistry topics.

At the secondary level, forty different items relate to chemical change (Unit S2). Studies of chemical change (S2.8) are directly related to by 32 items and indirectly by one, with all questions from test II. One item from those just mentioned also relates directly to chemical change (S2.1), joined by one further item from each test relating directly. Two questions from test I refer directly to balancing chemical equations (S2.5) and test I furnishes one more direct item for chemical equations (S2.3) and qualitative tests. Ten items relate to solutions (Unit S19), and all do so directly except three from test II which refer to the solubility of gases in water (S19.7). Two items relate to solutions and mixtures (S19.1), and one relates to classes of solutions (S19.4), all from test II. One item from test I relates directly to solubility (S19.5), and one from test II concerns problems in solubility (S19.8). One item from each test relates directly to the effect of solutes on fixed points (S19.9). Six different items from test I relate directly to the unit on structure of matter (S8), with four of these referring to the atomic theory (S8.3). Separation of substances (Unit S18) is related to six items, five of which are from test II with three questions relating directly to direct filtration. Chemistry units at the secondary level which are not related to items from these tests are consumer chemistry (S9) and environmental chemistry (S12). Forty items from test I and fifteen from test II have not been related to topics in the Intermediate Guidelines. Most of these items relate to topics usually covered in later high school chemistry courses.

Physics

Most of the items from these tests are more suited to senior high school physics curricula, so that few questions would be useful at the elementary level. The only elementary unit with any concentration of items is measurement (E5), with nine different items. Only one item is from test I and it relates directly to linear units (E5.3) and rounding (E5.5). From test II, two items relate directly to E5.3, three relate to mass units (E5.8), and three refer to time units (E5.9).

At the secondary level measurement (Unit S6) is again referenced by most items. Five of six items relating directly to length (S6.1) are from test II, and the same distribution is found for mass (S6.6). Four items from test II relate (three directly) to speed (S6.2) and three items from test I refer (two indirectly) to density problems (S6.11). Geometric optics (Unit S14) is related to 16 items of which 15 are direct. Ten questions concern lenses (S14.7), with six of these from test II. Four items, all from test I, relate (this includes the indirect item) to refraction (S14.6). Test I has one question relating to plane reflection and test II has one question referring to curved mirrors (S14.5). Many items relate to electricity and magnetism (Unit S11), with twelve different items relating (ten directly) to electric circuits (S11.7), ten of these questions coming from test II. One item from each test relates directly to electric units (S11.5) and one question from test I relates directly to electromagnetism (S11.9). Eleven different questions relate to heat (Unit S5). One series of three questions from test II relates directly to changes of state (S5.3) and a second series relates to the specific heat capacities of metals (S5.10). The other five questions relating to heat are all from test I and are distributed throughout the unit. Eleven items are concerned with mechanics (Unit S17), and all are from test I. Three items relate directly to balanced forces (S17.5), and three more refer directly to unbalanced forces (S17.6). Two items relate directly to pressure, while the other three items refer to the three topics moment of force (S17.7), energy (S17.10), and the gravity mass ratio (S17.2). All secondary level physical science units are referenced by at least one question from these tests. There are 23 items from test I and 13 items from test II which were not related to topics in the Intermediate Guidelines but which would relate to senior high school physics courses.

Table 33 Cooperative Science Tests

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS								E2 CLASSIFICATION											E3 FORCE AND ENERGY											
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
General																						1/	1/1							1/	
Advanced - I			1/								1/		/1						1/												
" - II																				1/		1/							2/	2/	

NAME OF SUBTEST	E4 INTERDEPENDENCE								E5 MEASUREMENT											E6 PROPERTIES OF MATTER									
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
General								1/											1/			5/		7/					
Advanced - I																				4/				5/	/2				
" - II																						1/		3/	2/	4/			

NAME OF SUBTEST	E7 ADAPTATION					E8 ASTRONOMY									E9 FORESTRY RESOURCES				
	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5
General				1/				1/1			1/	1/	1/						
Advanced - I				1/2				3/		1/	1/	7/		1/					1/
" - II																			

NAME OF SUBTEST	E10 HEAT/TEMPERATURE											E11 LIFE CYCLES								E12 LIGHT					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	4	.5	.6
General		1/			1/						1/														
Advanced - I																									
" - II		1/						1/	1/2																

Table 33 Cooperative Science Tests

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct/indirect

E13 MAGNETISM/ELECTRICITY

NAME OF SUBTEST	.1	2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13
General											1/	1/2	1/
Advanced - I													
" - II							3/		1/		2/	2/	

E14 MINING

NAME OF SUBTEST	.1	.2	.3	.4	.5
General					
Advanced - I					
" - II					

E15 PLANTS

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6
General						
Advanced - I				1/		
" - II						

E16 ROCKS/MINERALS

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
General				1/		4/					
Advanced - I		2/		2/		1/1			1/		
" - II											

E17 MACHINES

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
General										
Advanced - I										
" - II	/1				1/					

E18 SOLUTIONS

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8
General	3/1							
Advanced - I								
" - II	1/							

E19 WATER

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8
General	3/	1/		1/		/1		
Advanced - I	1/	/2		/1	1/	2/		
" - II			1/					

E20 WEATHER

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9
General		2/1	1/						
Advanced - I	6/2	1/	1/		1/		2/		1/
" - II	2/	3/	1/		3/				

E21 WISE USE OF ENERGY

Table 33 Cooperative Science Tests

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct/indirect

NAME OF SUBTEST	S1 CELLS										S2 CHEMICAL CHANGE										S3 ANIMALS															
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7									
General																							1/													
Advanced- I																							1/		4/1	2/										
" - II																																				

NAME OF SUBTEST	S4 GREEN PLANTS											S5 HEAT													S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10		.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12		.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	12
General												1/		1/		1/																				/1
Advanced - I		/1																																		
" - II												1/	1/	5/		/1										/1										/1

NAME OF SUBTEST	S7 POPULATIONS													S8 MATTER										S9 CONSUMER CHEMISTRY												
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8					
General																																				
Advanced - I																																				
" - II														4/		3/		1/		1/																

NAME OF SUBTEST	S10 CONTINUITY										S11 ELECTRICITY/MAGNETISM														S12 ENVIRONMENTAL CHEMISTRY											
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10					.1	.2	.3	.4								
General																	4/		1/	1/																
Advanced - I																																				
" - II											3/						3/																			

Table 33 Cooperative Science Tests

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
General																			1/			
Advanced - I				1/															/1			
" - II																						

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
General										1/2																
Advanced - I																										
" - II	2/							1/											5/1	1/						

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	9	.10	.11
General	4/																													
Advanced - I																														
" - II							1/		4/1																	1/			1/	

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
General					/1		8/		(4 items - inappropriate terms)
Advanced - I		2/			2/1		2/3		(12 items - inappropriate terms)
" - II									(7 items - inappropriate terms)

Table 33 Cooperative Science Tests--Biology

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS										E2 CLASSIFICATION													E3 FORCE AND ENERGY												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	10	.11	.12	
Test I			2/		2/		1/																													
Test II	1/				1/								5/		/1			1/	5/		4/													/1		

NAME OF SUBTEST	E4 INTERDEPENDENCE										E5 MEASUREMENT													E6 PROPERTIES OF MATTER												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			
Test I			1/																																	
Test II					1/		1/																													

NAME OF SUBTEST	E7 ADAPTATION								E8 ASTRONOMY												E9 FORESTRY RESOURCES															
	.1	.2	.3	.4	.5				.1	.2	.3	.4	.5	.6	.7	.8	.9				.1	.2	.3	.4	.5											
Test I		3/		1/																																
Test II				2/																					1/											

NAME OF SUBTEST	E10 HEAT/TEMPERATURE														E11 LIFE CYCLES											E12 LIGHT										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11				.1	.2	.3	.4	.5	.6	.7	.8				.1	.2	.3	.4	.5	.6					
Test I																			1/																	
Test II																			11/		1/	1/														

Table 33 Cooperative Science Tests--Biology

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY													E14 MINING					E15 PLANTS					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6
Test I																				1/1		1/	1/	
Test II																					1/	6/	3/	

NAME OF SUBTEST	E16 ROCKS/MINERALS											E17 MACHINES										E18 SOLUTIONS							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8
Test I																													
Test II																													

NAME OF SUBTEST	E19 WATER								E20 WEATHER									E21 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	
Test I					1/													
Test II					1/	1/												

Table 33 Cooperative Science Tests--Biology

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS .1	.2	.3	.4	.5	.6	.7	.8
Test I					1/			2/
Test II								

NAME OF SUBTEST	S2 CHEMICAL CHANGE .1	.2	.3	.4	.5	.6	.7	.8
Test I								
Test II				/1				

NAME OF SUBTEST	S3 ANIMALS .1	.2	.3	.4	.5	.6	.7
Test I	1/	/1	2/		6/1	1/3	
Test II		4/			/1	/1	

NAME OF SUBTEST	S4 GREEN PLANTS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10
Test I			1/		/1	4/				
Test II		2/	7/1		1/			2/	1/	

NAME OF SUBTEST	S5 HEAT .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
Test I												
Test II												

NAME OF SUBTEST	S6 MEASUREMENT .1	.2	.3	.4	.5	.6		.8	.9	.10	.11	.12
Test I												
Test II												

NAME OF SUBTEST	S7 POPULATIONS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
Test I			1/								
Test II				5/							

NAME OF SUBTEST	S8 MATTER .1	.2	.3	.4	.5	.6	.7	.8
Test I								
Test II								

NAME OF SUBTEST	S9 CONSUMER CHEMISTRY .1	.2	.3	.4	.5	.6	.7	.8
Test I								
Test II								

NAME OF SUBTEST	S10 CONTINUITY .1	.2	.3	.4	.5	.6	.7	.8
Test I							5/	1/
Test II	8/							

NAME OF SUBTEST	S11 ELECTRICITY/MAGNETISM .1	.2	.3	.4	.5	.6	.7	.8	.9	.10
Test I										
Test II										

NAME OF SUBTEST	S12 ENVIRONMENTAL CHEMISTRY .1	.2	.3	.4
Test I				
Test II				

Table 33 Cooperative Science Tests--Biology

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS .1	.2	.3	.4	.5	.6	.7	.8	.9	S14 GEOMETRIC OPTICS .1	.2	.3	.4	.5	.6	.7	.8	S15 INTERACTION WITH BIOSPHERE .1	.2	.3	.4	.5
Test I																						
Test II	1/1			1/	/1	/1	/1		1/													

NAME OF SUBTEST	S16 MACHINES .1	.2	.3	.4	.5	.6	.7	.8	S17 MECHANICS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	S18 SUBSTANCE SEPARATION .1	.2	.3	.4	.5	.6	.7
Test I																										
Test II																										

NAME OF SUBTEST	S19 SOLUTIONS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	S20 TERRESTIAL AND AQUATIC ENVIRONMENTS .1	.2	.3	.4	.5	.6	.7	.8	.9	S21 VIBRATIONS AND WAVES .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
Test I																														
Test II													1/																	

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS .1	.2	.3	.4	.5	.6	.7	.8	S23 WISE USE OF ENERGY
Test I						1/	5/		(15 items are not related)
Test II									(5 items are not related)

Table 33 Cooperative Science Tests--Chemistry

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS										E2 CLASSIFICATION													E3 FORCE AND ENERGY												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	
Test I																																				
Test II																																				

NAME OF SUBTEST	E4 INTERDEPENDENCE										E5 MEASUREMENT													E6 PROPERTIES OF MATTER												
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			
Test I																												1/					1/			
Test II															1/			1/																		

NAME OF SUBTEST	E7 ADAPTATION								E8 ASTRONOMY												E9 FORESTRY RESOURCES															
	.1	.2	.3	.4	.5				.1	.2	.3	.4	.5	.6	.7	.8	.9				.1	.2	.3	.4	.5											
Test I																																				
Test II																																				

NAME OF SUBTEST	E10 HEAT/TEMPERATURE														E11 LIFE CYCLES											E12 LIGHT										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11				.1	.2	.3	.4	.5	.6	.7	.8				.1	.2	.3	.4	.5	.6					
Test I																																				
Test II																																				

Table 33 Cooperative Science Tests--Chemistry

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY													E14 MINING					E15 PLANTS					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6
Test I																1/								
Test II																								

NAME OF SUBTEST	E16 ROCKS/MINERALS											E17 MACHINES										E18 SOLUTIONS							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8
Test I								1/																		1/			
Test II								/1															2/			1/			

NAME OF SUBTEST	E19 WATER								E20 WEATHER									E21 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	
Test I																		
Test II																		

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Table 33 Cooperative Science Tests-Chemistry

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct/indirect

NAME OF SUBTEST	S1 CELLS										S2 CHEMICAL CHANGE										S3 ANIMALS															
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7									
Test I											1/		1/		2/		1/																			
Test II											2/							35/1																		

NAME OF SUBTEST	S4 GREEN PLANTS										S5 HEAT												S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10		.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12		.1	.2	.3	.4	.5	.6		.8	.9	.10	.11	.12
Test I																																				
Test II																																				

NAME OF SUBTEST	S7 POPULATIONS												S8 MATTER									S9 CONSUMER CHEMISTRY												
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8					
Test I																4/	2/		1/																	
Test II																																				

NAME OF SUBTEST	S10 CONTINUITY										S11 ELECTRICITY/MAGNETISM														S12 ENVIRONMENTAL CHEMISTRY											
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10					.1	.2	.3	.4								
Test I																																				
Test II																																				

Table 33 Cooperative Science Tests--Chemistry

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS .1	.2	.3	.4	.5	.6	.7	.8	.9
Test I									
Test II									

NAME OF SUBTEST	S14 GEOMETRIC OPTICS .1	.2	.3	.4	.5	.6	.7	.8
Test I								
Test II								

NAME OF SUBTEST	S15 INTERACTION WITH BIOSPHERE .1	.2	.3	.4	.5
Test I					
Test II					

NAME OF SUBTEST	S16 MACHINES .1	.2	.3	.4	.5	.6	.7	.8
Test I								
Test II								

NAME OF SUBTEST	S17 MECHANICS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
Test I											
Test II											

NAME OF SUBTEST	S18 SUBSTANCE SEPARATION .1	.2	.3	.4	.5	.6	.7
Test I				1/			
Test II	3/			1/		/1	

NAME OF SUBTEST	S19 SOLUTIONS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10
Test I					1/				1/	
Test II	2/			1/			3/	1/	1/	

NAME OF SUBTEST	S20 TERRESTIAL AND AQUATIC ENVIRONMENTS .1	.2	.3	.4	.5	.6	.7	.8	.9
Test I									
Test II									

NAME OF SUBTEST	S21 VIBRATIONS AND WAVES .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
Test I											
Test II											

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS .1	.2	.3	.4	.5	.6	.7	.8
Test I								
Test II								

NAME OF SUBTEST	S23 WISE USE OF ENERGY
Test I	(40 items are not related)
Test II	(15 items are not related)

Table 33 Cooperative Science Tests--Physics

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS								E2 CLASSIFICATION											E3 FORCE AND ENERGY											
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	10	11	.12
Test I																							1/					1/			
Test II																															

NAME OF SUBTEST	E4 INTERDEPENDENCE								E5 MEASUREMENT											E6 PROPERTIES OF MATTER									
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
Test I											1/		1/																1/
Test II											2/					3/	3/												

NAME OF SUBTEST	E7 ADAPTATION					E8 ASTRONOMY									E9 FORESTRY RESOURCES				
	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5
Test I																			
Test II																			

NAME OF SUBTEST	E10 HEAT/TEMPERATURE											E11 LIFE CYCLES								E12 LIGHT					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6
Test I		1/																				1/	1/		
Test II																									

Table 33 Cooperative Science Tests--Physics

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
Test I							1/	1/					1/																					
Test II																																		

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	
Test I																																		
Test II																																		

NAME OF SUBTEST	E19 WATER										E20 WEATHER									E21 WISE USE OF ENERGY														
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
Test I																																		
Test II															2/																			

Table 33 Cooperative Science Tests--Physics

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS								S2 CHEMICAL CHANGE								S3 ANIMALS						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7
Test I																							
Test II																							

NAME OF SUBTEST	S4 GREEN PLANTS										S5 HEAT												S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
Test I											1/				1/			1/			/1	/1	1/					1/					1/2	
Test II													3/							3/			5/	3/1				3/				2/		

NAME OF SUBTEST	S7 POPULATIONS											S8 MATTER								S9 CONSUMER CHEMISTRY							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8
Test I														2/													
Test II																											

NAME OF SUBTEST	S10 CONTINUITY								S11 ELECTRICITY/MAGNETISM										S12 ENVIRONMENTAL CHEMISTRY			
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4
Test I									2/				1/		2/		1/					
Test II													1/		8/2							

Table 33 Cooperative Science Tests--Physics

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct/indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
Test I													1/		3/1	4/						
Test II														1/		6/						

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
Test I								1/		1/			3/	3/	/1			/1	2/							
Test II																										

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
Test I																														
Test II																														

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
Test I									(23 items are not related)
Test II									(13 items are not related)

Table 33A

Test Analysis: Specific Items Related to Objectives

Cooperative Science Tests

Objective	Subtest and Item		
	General Science	Advanced General Science	
		I	II
E1.3		9	
E2.3		4	
E2.5		(26)	
E2.11		4	
E3.1			23
E3.3	9		23
E3.4	13, (43)		
E3.10			4, 11
E3.11	24		4, 11
E4.8	4		
E5.11	45		
E6.1	—	27, 28, 29, 30	
E6.3	44, 45, 46, 47, 48		33
E6.5	7, 40, 41, 42, 54, 55, 56	1, 19, 20, 21, 22	50, 51, 52
E6.6		(49), (50)	5, 42
E6.7			5, 31, 33, 42
E7.4	3	27, (29), (30)	
E8.3	14, (10)	40, 44, 54	
E8.5		47	
E8.6	23	52	
E8.7	10	36, 47, 56, 57, 58, 59, 60	
E8.8	5		
E8.9		32	
E9.5		2	
E10.2	21		14
E10.5	32		
E10.8			13
E10.9			16, (17), (18)

Objective	Subtest and Item		
	General Science	Advanced General Science	
		I	II
E10.11	18		
E13.7			28, 29, 30
E13.9			30
E13.11	57		19, 20
E13.12	58,(59), (60)		2, 20
E13.13	12		
E15.4		9	
E16.2		35, 45	
E16.4	2	31, 33	
E16.6	49, 50, 51, 52	(37), 45	
E16.9		34	
E17.1			(3)
E17.5			6
E18.1	37 , 38, 39, (36)		44
E19.1	6, 11, 19	34	
E19.2	6	(49), (50)	
E19.3			39
E19.4	3	(4)	
E19.5		51	
E19.6	(2)	31, 33	
E20.1		42, 43, 46, 51, 53, 55, (52), (55)	25, 26
E20.2	25, 53, (43)	46	37, 48, 49
E20.3	19	39	18
E20.5		42	25, 26, 27
E20.7		46, 48	
E20.9		55	
S2.1			34
S2.7			50, 51, 52
S2.8	7, 26, 27, 30, 54 (8), (28), (29), (55), (56)		37, 40, 46, 47
S3.3	20	11	
S3.5		14,15,16,(17),18	
S3,6		8, 28	

Objective	Subtest and Item		
	General Science	Advanced General Science	
		I	II
S4.2		(13)	
S5.1	21		14
S5.2			13
S5.3	6		5, 16, 17, 18, 31
S5.5	18		(33)
S6.2			(1)
S6.12	(25)		(9)
S8.1			57, 58, 59, 60
S8.3			45, 57, 58
S8.5			41
S8.7			35
S11.1			28, 29, 30
S11.7	57, 58, 59,60		2, 19, 20
S11.9	12		
S11.10	24		
S13.4		13	
S15.2	4	(10)	
S16.1			3, 6
S16.8			3
S17.2	(9), 13, (43)		
S17.11			21, 22, (23), 24 48, 49
S18.1			38
S19.1	36, 37, 38, 39		
S19.7			52
S19.9			43, 53, (54), 55, 56
S21.7			1
S21.10			12
S22.2		23, 26	
S22.5	(22)	21, 24, (25)	
S22.7	1,3,16,17,32,33, 34,35	5,6,(7),(10),(12)	
Not related	2, 15, 31		7, 10, 15
Inappropriate Terminology	3, 13, 41, 46	11, 27, 28, 29, 30, 43, 48, 56, 57, 58, 59, 60	1, 3, 21, 22, 23, 24, 45

Objective	Subtest and Item					
	General Science		Advanced General Science I		II	
Not related	2, 15, 31				7, 10, 12, 15	
Inappropriate Terminology	3, 13, 41, 46		11, 27, 28, 29, 30, 43, 48, 56, 57, 58, 59, 60		1, 3, 21, 22, 23, 24, 45	
	Biology		Chemistry		Physics	
	Test I	Test II	Test I	Test II	Test I	Test II
E1.1		14				
E1.3	30,31					
E1.5	6, 7	19				
E1.7	3					
E2.3		14,31,32,33,34				
E2.5		(33)				
E2.8		1				
E2.9		31,35,36,37,38				
E2.11		5,8,9.34				
E3.4					25	
E3.9					11	
E3.11		(20)				
E4.3	18					
E4.5		13				
E4.7		7				
E5.3					22	14,15
E5.5				1	22	
E5.8				1		5,6,7
E5.9						8,9,34
E6.5			19			
E6.10			58		12	
E7.2	3,16,21					
E7.4	33	2, 15				
E9.5		10				

Objective	Subtest and Item					
	Biology		Chemistry		Physics	
	Test I	Test II	Test I	Test II	Test I	Test II
E10.2					16	
E1 1.5	30	17,35,36,37,38,43,44,45,46,47,48				
E1 1.7		4				
E1 1.8		4				
E1 2.3					43	
E1 2.4					44	
E1 3.7					15	
E1 3.8					40	
E1 3.13					26	
E1 4.3			(19)			
E1 5.2	(22),31					
E1 5.3		12				
E15.4	30	17,31,35,36,37,38				
E1 5.5	22	3,22,27				
E1 6.6	(10),(24) 32					
E16.8			34	(17)		
E18.2				25,27		
E18.5			34	17		
E19.5	31	29				
E19.6		10				
E20.5						1,3
S1.5	23					
S1.8	25,26					
S2.1			14	8,54		
S2.3			2			
S2.4		(20)				
S2.5			17,27			
S2.7			11			
S2.8				7-18,22,23,24,28-37,46,48-54,(21)		

Objective	Subtest and Item					
	Biology		Chemistry		Physics	
	Test I	Test II	Test I	Test II	Test I	Test II
S3.1	47					
S3.2	(37)	39,40,41, 42				
S3.3	6,7					
S3.5	(13),14 56-60	19				
S3.6	(9),(29), 44,(45)	(32)				
S3.7					6	
S4.2		13,14				
S4.3	12	13,28,55, 56,57,58, 60,(59)				
S4.5	(43)	18				
S4.6	25,26, 31,41					
S4.8		23,25				
S4.9		13				
S5.1					5	
S5.3						16,17,18
S5.5					11	
S5.8					3	
S5.10						23,24,25
S5.11					(1)	
S5.12					(4)	
S6.1					22	14,15,19 20,21
S6.2						35,36,40, (39)
S6.6					25	5,6,7
S6.10						10,30
S6.11					38,(13), (19)	
S7.3	18					
S7.4		49,50,51, 52,53				
S8.3			22,24,25, 29		12,30	

Objective	Subtest and Item					
	Biology		Chemistry		Physics	
	Test I	Test II	Test I	Test II	Test I	Test II
S8.4			31,33			
S8.6			29			
S10.1		12,31, 43-48				
S10.7	28,51-55					
S10.8	27					
S11.1					15,40	
S11.5					51	50
S11.7					49,51	2,26-28, 46-49, (29),(50)
S11.9					26	
S13.1		21,(33)				
S13.4		16				
S13.5		(33)				
S13.6		(33)				
S13.7		(33)				
S13.9		1				
S14.4					43	
S14.5						33
S14.6					34,44,45, (24)	
S14.7					28,56,57, 58	22,41-45
S16.8					17	
S17.2					25	
S17.5					19,32,38	
S17.6					7,8,9	
S17.7					(10)	
S17.10					(2)	
S17.11					13,23	
S18.1				9,10,13		
S18.4			56	16		
S18.6				(17)		
S19.1				41,42		

Objective	Subtest and Item					
	Biology		Chemistry		Physics	
	Test I	Test II	Test I	Test II	Test I	Test II
S19.4				25		
S19.5			15			
S19.7				(22-24)		
S19.8				27		
S19.9			32	26		
S20.3		29				
S21.4						8, 9
S21.6					46	
Not related	1,2,4,8, 11,19,20, 38,40,42, 46,48,49, 50,39	6,11,24,26, 30	1,3,5,6, 7,8,9,10, 12,13,16, 20,21,23, 26,28,30, 35,36,37, 38,39, 40-55, 57,60	2,3,4,5,6, 19,20,38, 39,40,43, 44,45,47, 55	14,18,20, 21,27,29, 31,33,35, 36,37,39, 41,42, 47,48,50, 52,53,54, 55,59,60	4,11,12, 13,31,32, 37,38,51, 52,53,54, 55
Inappropriate terminology	56,57,58, 59,60	55,56,57, 58,59,60	20,35,36, 37,38,39, 40,42,51	2-5,7-14, 19,25,26, 27,28,29, 30,31,32, 38,39,40, 43,44,45	1-6,17, 20,22,23, 32,33,35, 38,39,41, 52-55	8,14,15, 30,35,36, 37,46,50

READ GENERAL SCIENCE TEST

Description

The Read General Science Test measures the extent to which important objectives of a typical general science course have been attained by students in grades 7, 8, and 9. These basic objectives include the acquisition of knowledge; the development of understanding; and the application of facts, concepts, and principles commonly found in the general science curriculum.

Summary of Item Analysis

The Read General Science Test consists of 75 items which refer to many units in the intermediate guidelines. At the elementary level, eight items relate to astronomy (Unit E8) with five questions relating (three directly) to the earth (E8.3), and two items relating directly to other celestial bodies (E8.8). The same concentration of items applies to the weather (Unit E20) where 8 items relate directly. Three topics in this unit are referenced by two items each: the nature of the atmosphere (E20.1), characteristics of precipitation (E20.4), and weather forecasting (E20.7). Seven items relate directly to characteristics of living things (Unit E1) with five of these referring to variety of organisms (E1.1). Six questions relate to life cycles (Unit E11) with four items concerned (three directly) with the life cycle of a seed-bearing plant (E11.5). Rocks and minerals (Unit E16) and classification of living things (Unit E2) are each related to five items. The following elementary units were not related to any items: adaptation and behaviour (E7), forestry resources (E9), light (E12), mining resources (E14), and solutions (E18).

At the secondary level the items cover a broad spectrum of units with only two areas of concentration. Six different items relate (five directly) to reporduction in plants and animals (S10.1), and five items relate to the unit on machines (S16). The five items are distributed over four topics in S16: review of machines (S16.1), experimental study of pulley system (S16.2), forms of energy in machines (S16.4), and machine problems (S16.8). The following secondary units were not related to any items: populations and communities (S7), consumer chemistry (S9), solutions (S19), terrestrial and aquatic environments (S20), and viruses, monerans, and protists (S22).

Ten items from the test were not related to any topics in the guidelines. Four of these items relate to geology.

Table 34 Read General Science Test

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST

E1 LIVING THINGS

.1	.2	.3	.4	.5	.6	.7	.8
5/				1/	1/		

E2 CLASSIFICATION

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
		/1							1/	3/

E3 FORCE AND ENERGY

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
									2/	2/	

NAME OF SUBTEST

E4 INTERDEPENDENCE

.1	.2	.3	.4	.5	.7	.6	.8
				1/	1/		

E5 MEASUREMENT

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
								/1		

E6 PROPERTIES OF MATTER

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
				1/					

NAME OF SUBTEST

E7 ADAPTATION

.1	.2	.3	.4	.5

E8 ASTRONOMY

.1	.2	.3	.4	.5	.6	.7	.8	.9
	/1	3/2				1/	2/	

E9 FORESTRY RESOURCES

.1	.2	.3	.4	.5

NAME OF SUBTEST

E10 HEAT/TEMPERATURE

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
						1/				

E11 LIFE CYCLES

.1	.2	.3	.4	.5	.6	.7	.8
1/		1/		3/1		1/	

E12 LIGHT

.1	.2	.3	.4	.5	.6

Table 34 Read General Science Test

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
		1/																							1/									

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	
			1/	1/	3/											/2	/1					1/												

NAME OF SUBTEST	E19 WATER										E20 WEATHER									E21 WISE USE OF ENERGY														
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
	1/					1/		1/			2/			2/	1/	1/	2/																	

Table 34 Read General Science Test

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS								S2 CHEMICAL CHANGE								S3 ANIMALS						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7
		1/			1/				2/							1/						1/	

NAME OF SUBTEST	S4 GREEN PLANTS										S5 HEAT												S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
			1/	1/								1/												/1										1/

NAME OF SUBTEST	S7 POPULATIONS											S8 MATTER								S9 CONSUMER CHEMISTRY							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8
														1/					1/								

NAME OF SUBTEST	S10 CONTINUITY								S11 ELECTRICITY/MAGNETISM										S12 ENVIRONMENTAL CHEMISTRY			
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4
	5/1													/1	1/	1/						/1

Table 34 Read General Science Test

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS											S14 GEOMETRIC OPTICS											S15 INTERACTION WITH BIOSPHERE													
	.1	.2	.3	.4	.5	.6	.7	.8	.9			.1	.2	.3	.4	.5	.6	.7	.8				.1	.2	.3	.4	.5									
		/1					/1	/1	/1				/1											1/												

NAME OF SUBTEST	S16 MACHINES										S17 MECHANICS													S18 SUBSTANCE SEPARATION												
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7						
	1/	/1		2/				1/1							1/												1/									

NAME OF SUBTEST	S19 SOLUTIONS												S20 TERRESTIAL AND AQUATIC ENVIRONMENTS											S21 VIBRATIONS AND WAVES												
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	.9			.1	.2	.3	.4	.5	.6	.7	.8	9	.10	.11		
																									/1											

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS																		S23 WISE USE OF ENERGY																	
	.1	.2	.3	.4	.5	.6	.7	.8																												
						/1	/1			(10 items are not related; 9 items- inappropriate terms)																										

Table 34A

Test Analysis: Specific Items Related to Objectives

Read General Science Test--Form E

Objective	Subtest	Item
	General Science	
E1.1		32, 33, 36, 45, 58
E1.5		9
E1.6		5
E2.3		(6)
E2.10		36
E2.11		6, 32, 33
E3.10		7, 24
E3.11		7, 64
E4.5		59
E4.7		28
E5.9		(75)
E6.5		4
E8.2		(22)
E8.3		11, 57, 70, (22), (51)
E8.7		73
E8.8		1, 17
E10.7		61
E11.1		15
E11.3		15
E11.5		34, 35, 69, (48)
E11.7		65
E13.2		14
E15.3		34
E16.3		16
E16.4		20
E16.5		18, 19, 40
E17.3		(8), (13)
E17.4		(8)
E17.9		42
E19.4		63
E19.6		39
E19.8		25

Objective	Subtest	Item
	General Science	
E20.1		43, 58
E20.4		38, 62
E20.5		30
E20.6		54
E20.7		44,46
S1.2		5
S1.5		66
S2.1		4, 31
S2.8		4
S3.6		2
S4.3		59
S4.4		59
S5.2		61
S6.2		(51)
S6.12		60
S8.3		71
S8.8		53
S10.1		15, 34, 35, 48, 69, (74)
S11.6		(24)
S11.7		12
S11.8		14
S12.4		(28)
S13.2		(45)
S13.7		(45)
S13.8		(45)
S13.9		(45)
S14.2		(47)
S16.1		8
S16.2		(13)
S16.4		7,64
S16.8		(13), 42
S15.2		37
S17.5		42
S18.4		49
S21.2		(55)

Objective	Subtest	Item
	General Science	
Not related		3,10,23,26,27,50,52,56,67,72
Inappropriate Terminology		10,22,38,42,50,51,55,60,61

SRA ASSESSMENT SURVEY--MULTILEVEL SET

Description

The SRA Assessment Survey is composed of adaptable measuring instruments designed to produce the variety of results desired by individual school testing programs.

The Achievement Series (ACH) measures the educational development of students in grades 1 through 9 in basic curriculum areas. When these tests are followed by the Iowa Tests of Educational Development at the high school level, the SRA Assessment Survey provides a program of continuous and comprehensive measurement for grades 1 through 12. Within ACH, since the emphasis is on reliable measurement over a wide range of individual and group differences, each edition covers broad ranges, and the individual tests overlap.

The ACH multilevel edition consists of three separate but overlapping tests of graduated difficulty designed to use in grades 4 through 9. The blue level is the easiest, the red level the most difficult. The green level overlaps the upper end of the blue level and the lower end of the red level. Each colour-coded booklet contains Reading (including Vocabulary), Mathematics, Language Arts (including Spelling), Social Studies, Use of Sources, and Science tests and is available on either a school-owned or rental basis.

Summary of Item Analysis

During the following analysis one must remember that the 80 items which comprise this subtest are distributed equally between two booklets, blue and red. The 40 items in the green booklet are identical with the last 20 items in the blue booklet and the first 20 in the red booklet. The three booklets thus present an overlapping means of evaluation which are simply referred to as blue, green, or red in the analysis.

In the elementary panel, questions relating to astronomy (Unit E8) occur most often. An item which appears in the green and red levels relates directly to the historical development of astronomy (E8.1); one item in the red level relates directly to orbital motion (E8.2). Four different items relate directly to the earth (E8.3), two of these appear in both the blue and green levels, while another two appear only in the red level. The moon (E8.4) is referred to directly by one item in the blue level and indirectly by one item in the red level. The planets (E8.5) is similarly related directly to by one item in the blue level, and indirectly by one item in the red level. The sun (E8.6) is related to three times (once directly, and twice indirectly) by the green level, with one item appearing in the blue and the other two items also appearing in the red levels. One more item in the blue level relates indirectly to this topic, and one more item relates to it directly in the red level. The unit on characteristics of living things (E1) is related to by items at all three levels. Three questions refer directly to variety of organisms (E1.1) in the blue booklet, and one item also appears in the green level. One item relates indirectly to growth (E1.3) at the blue level, and one item relates indirectly to reproduction (E1.4) and appears in both the blue and green booklets. Three items appear in the green booklet which relate directly to metabolism (E1.5). Two of these items are also found in the blue booklet where another two items relate indirectly to this topic. The third question relating to metabolism in the green level is also found in the red level. One item, found in both the blue and green booklets, relates directly to the cellular basis of life (E1.6). The unit concerning classification of living things (E2) is related to by 14 different items. Three items in the blue level relate directly to informal biological classification (E2.3), and one of these also appears at the green level. A second item relates directly to this topic and

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appears in both the green and red levels with a further two items relating indirectly in the red level. Vertebrates (E2.11) are directly referred to by six items in the blue level, and one item which relates indirectly appears in both the green and red levels. Seed producers (E2.9) is directly related to one item which appears in both the green and blue levels, and a second question relates indirectly to this topic in the blue level. The unit on force and energy (E3) is related to by questions which appear mostly in the green and red levels, with only one item appearing in the blue level (and also the green) which relates directly to energy (E3.7). Three items related directly to two topics, forms of energy (E3.10) and energy conversion (E3.11) and appear in both the green and red levels, with a fourth item directly related to E3.10. One item relates indirectly to examples of forces (E3.1) in the red booklet. Interdependence of living things (Unit E4) is referred to by questions from all levels. Three items relate (two directly and one indirectly) to producers, consumers, and food chains (E4.4) at the red level with the indirectly related item also found in the green booklet. One item which directly relates to photosynthesis and respiration is found in both the green and red booklets. Biological change (E4.6) is related to by seven items (five directly and two indirectly) which appear in the blue level, with one of the indirect items also found in the green booklet. Properties of matter (Unit E6) is related to by seven different items. One question relates indirectly to matter (E6.8) and is found in both the blue and green levels, and one item, found only in the blue booklet relates directly to description of an object (E6.1). Two items relate indirectly to description of a single substance (E6.2) and are found in the blue and green booklets. The topic solid, liquid, and gas (E6.7) is directly referred to by three items in the green level, one of which is found in the blue level and the other two are found in the red level. One additional item which appears in the red booklet relates indirectly to the same topic. Heat and temperature (Unit E10) is indirectly related to five different items, and directly related to one item, the latter being in the red booklet and relates to kinetic molecular theory (E10.11). Four of the other items relate to sources of heat (E10.1) and appear in both the green and red levels, while the fifth question appears in the blue booklet and relates to convection (E10.7). In the unit life cycles (E11) a series of six items in the blue level relate directly to the life cycle of a frog (E11.8). Two questions relate directly to the life cycle of a seed-bearing plant (E11.5) and appear in the blue series, with one item also found in the green booklet. In the elementary panel the following units are not referenced by any items in the SRA science subtests: measurement (E5), adaptation and behaviour (E7), forestry resources (E9), mining resources (E14), and solutions (E18).

In the secondary panel, eight different items relate to the structure of matter (Unit S8). Five of these relate (four directly and one indirectly) to the atomic theory (S8.3) with two of the direct items appearing in both the blue and green series and the others appearing in both the green and red levels. Six items appear in both the green and red booklets and relate directly to the elements (S8.5) and to the periodic table (S8.7). Three items relate directly to elements and compounds (S8.8) in the green booklet with two of these items also appearing in the blue series and the third in the red series. Machines (Unit S16) are referenced eight times. Three items in the green booklet relate directly to review of machines (S16.1) and indirectly to the operation of a machine (S16.7), while five items appear in both the blue and green series and relate directly to experimental investigations of a machine (S16.3). Unit S3, functioning animals, is referred to by seven different items. One question which appears in both the green and red series relates indirectly to nutrition (S3.6) and all the other items relate directly. One item appears in the blue and green series and relates directly to breathing and health (S3.4), and another two relate to metabolism (S3.1). Food and energy (S3.7) is related to three items in the red series, one of these also appearing in the green. Five different items relate to mechanics (Unit S17). One item indirectly relates to two topics, balanced forces and moment of force (S17.5) and S17.7 respectively), and is in the red series only. One item, also in the red series, relates indirectly to force (S17.1). One item in the blue series relates directly to friction (S17.3). Energy (topic S17.10) is directly related to one item which appears in both the blue and green series, and indirectly related to one question which is found only in the red booklet. Four different items relate directly to the unit on measurement (S6) and all appear in the red series only. Two questions which are only in the red booklet relate to the role of green plants (S4.2), and one of these items also relates directly to humans and plants (S4.10). Three questions relate directly to changes of state (S5.3), two of them are in the green booklet with one appearing in each of the blue and red series, and the third item is in the red series only. Three different items relate to the unit S14, geometric optics. Two relate (one directly, one indirectly) to lenses (S14.7) and are in the blue booklet with the indirect item also in the green series. The third item relates directly to dispersion and colour (S14.8) and is in the red level only. One question in the red series relates indirectly to two topics, reproduction in plants and animals (S10.1), and human genetics (S10.6). Two items are found in both the green and red series with one question relating directly to magnetism (S11.8), and the second relating also directly to electric energy conversions (S11.10). One question relates indirectly to population growth (S15.4) and directly to human characteristics (S15.2). This latter topic is further related directly to one item which appears in both the blue and green levels (S15.2). Two items relate directly to microbes and disease (S22.7) and are found in both the green and red levels. The following topics are related to by single items: chemical change (S2.1, directly, red series), ecosystems (S7.3, indirectly, blue and green series), complex algae (S13.7, directly, blue and green series) and transmission of sound (S21.7, directly, red series). The following secondary units are unrelated to items in any of the series: consumer chemistry (S9), environmental chemistry (S12), separation of substances (S18), solutions (S19), and terrestrial and aquatic environments (S20).

Only three items in the SRA science subtest series are unrelated to items in the Intermediate guidelines. Two appear in the green level and of those one is also found in the blue level and one in the red level. A third unrelated item is also found in the blue level.

Table 35 SRA Assessment Survey--Multilevel Set

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS .1	.2	.3	.4	.5	.6	.7	.8
BLUE	3/		/1	/1	2/2	1/		
GREEN	1/			/1	3/			
RED					1/			

NAME OF SUBTEST	E2 CLASSIFICATION .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
BLUE			3/						1/1		6/
GREEN			2/						1/		/1
RED			1/2								/1

NAME OF SUBTEST	E3 FORCE AND ENERGY .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
BLUE	/1						1/					
GREEN							1/			3/	3/	
RED										4/	3/	

NAME OF SUBTEST	E4 INTERDEPENDENCE .1	.2	.3	.4	.5	.7	.6	.8
BLUE							5/2	
GREEN				/1			/1	
RED				2/1				

NAME OF SUBTEST	E5 MEASUREMENT .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
BLUE											
GREEN											
RED											

NAME OF SUBTEST	E6 PROPERTIES OF MATTER .1	.2	.3	.4	.5	.6	.7	.8	.9	.10
BLUE	1/	/2					1/	/1		
GREEN		/2					3/	/1		
RED							2/1			

NAME OF SUBTEST	E7 ADAPTATION .1	.2	.3	.4	.5
BLUE					
GREEN					
RED					

NAME OF SUBTEST	E8 ASTRONOMY .1	.2	.3	.4	.5	.6	.7	.8	.9
BLUE			2/	1/	1/	1/2			
GREEN	1/		2/			1/2			
RED	1/	1/	2/	/1	/1	2/1			

NAME OF SUBTEST	E9 FORESTRY RESOURCES .1	.2	.3	.4	.5
BLUE					
GREEN					
RED					

NAME OF SUBTEST	E10 HEAT/TEMPERATURE .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
BLUE							/1				
GREEN	/4										
RED	/4										1/

NAME OF SUBTEST	E11 LIFE CYCLES .1	.2	.3	.4	.5	.6	.7	.8
BLUE					2/			6/
GREEN					1/			
RED								

NAME OF SUBTEST	E12 LIGHT .1	.2	.3	4	.5	.6
BLUE					1/1	
GREEN					/1	
RED						1/

Table 35 SRA Assessment Survey--Multilevel Set

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	6						
BLUE									1/																	2/	1/							
GREEN						1/																				1/	1/							
RED						1/																												

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	7	.8	
BLUE		/1			1/	1/									/3	3/																		
GREEN			1/		1/	1/																												
RED			1/																															

NAME OF SUBTEST	E19 WATER										E20 WEATHER									E21 WISE USE OF ENERGY														
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
BLUE		1/										1/																						
GREEN		1/																																
RED												/1			/2																			

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Table 35 SRA Assessment Survey--Multilevel Set

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS								S2 CHEMICAL CHANGE								S3 ANIMALS						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7
BLUE	1/	1/															2/			1/			
GREEN	1/	1/															2/			1/		/1	1/
RED			1/						1/													/1	3/

NAME OF SUBTEST	S4 GREEN PLANTS										S5 HEAT												S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
BLUE													1/																					
GREEN			1/										2/																					
RED		2/	1/							1/			2/													2/					1/			1/

NAME OF SUBTEST	S7 POPULATIONS											S8 MATTER								S9 CONSUMER CHEMISTRY							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8
BLUE			/1											2/					2/								
GREEN			/1											4/1		6/		6/	3/								
RED														2/1		6/		6/	1/								

NAME OF SUBTEST	S10 CONTINUITY								S11 ELECTRICITY/MAGNETISM										S12 ENVIRONMENTAL CHEMISTRY			
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4
BLUE																						
GREEN																1/		1/				
RED	/1						/1									1/		1/				

Table 35 SRA Assessment Survey--Multilevel Set

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct/indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
BLUE							1/									1/1						
GREEN							1/									/1						
RED																	1/		1/		/1	

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
BLUE	3/		5/				/3				1/							1/								
GREEN			5/															1/								
RED									/1				/1		/1			/1								

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
BLUE																														
GREEN																														
RED																										1/				

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
BLUE									(2 items - not related; 5 items - inappropriate terms)
GREEN							2/		(2 items - not related; 6 items - inappropriate terms)
RED							2/		(1 item - not related; 6 items - inappropriate terms)

Table 35A

Test Analysis: Specific Items Related to Objectives

SRA Assessment Survey

Multilevel Set

Objective	Subtest	Item		
		Blue	Green	Red
	Science			
E1.1		1,2,24	4	
E1.3		(16)		
E1.4		(21)	(1)	
E1.5		22,24,(1),(2)	2,4,26	6
E1.6		21	1	
E2.3		1,2,24	4,29	9,(29),(30)
E2.9		31, (16)	11	
E2.11		10,11,12,13, 14,15	(29)	(9)
E3.1				(26)
E3.7		27	7	
E3.10			21,22,23	1,2,3,36
E3.11			21,22,23	1,2,3
E4.4			(27)	29,30,(7)
E4.6		10,12,13,14, 15,(16),(31)	(11)	
E6.1		6		
E6.2		(25),(26)	(5),(6)	
E6.7		34	14,24,30	4,10,(35)
E6.8		(34)	(14)	
E8.1			32	12
E8.2				39
E8.3		32,33	12,13	39,40
E8.4		5		(40)
E8.5		17		(38)
E8.6		(5),(33)	32,(13),(21)	12,38,(1)
E10.1			(21),(22),(23) (27)	(1),(2),(3), (7)
E10.7		(18)		
E10.11				35

Objective	**Subtest**	**Item**		
	Science			
		Blue	Green	Red
E11.5		16,31	11	
E11.8		10,11,12,13, 14,15		
E12.5		4,(23)	(3)	
E12.6				34
E13.6			40	20
E13.9		6		
E15.4		16,31	11	
E15.5		31	11	
E16.2		(20)		
E16.3			25	5
E16.5		27	7	
E16.6		29	9	
E17.2		(7),(8),(9)		
E17.3		7,8,9		
E17.7		19		
E19.2		34	14	
E17.10		7, 8, 9		
E20.2		18		(31)
E20.5				(31),(32)
S1.1		23	3	
S1.2		21	1	
S1.3				33
S2.1				27
S3.4		22	2	
S3.6			(29)	(9)
S3.1		22,24	2,4	
S3.7			27	7,29,30
S4.2				29,30
S4.3			26	6
S4.10				29
S5.3		34	14,24	4,35
S6.4				23,25
S6.9				24
S6.12				21
S7.3		(28)	(8)	

Objective	Subtest	Item		
	Science			
		Blue	Green	Red
S8.3		25,26	5,6,36,37, (38)	16,17,(18)
S8.5			33,34,35,36, 37,38	13,14,15,16, 17,18
S8.7			33,34,35,36, 37,38	13,14,15,16, 17,18
S8.8		25,26	5,6,35	15
S10.1				(28)
S10.6				(28)
S11.8			40	20
S11.10			23	3
S13.7		30	10	
S14.7		4,(23)	(3)	
S14.8				34
S15.2		22	2	28
S15.4				(28)
S16.1		7,8,9		
S16.3		36,37,38 39,40	16,17,18 19,20	
S16.7		(7),(8),(9)		
S17.1				(24)
S17.3		19		
S17.5				(22)
S17.7				(22)
S17.10		27	7	(36)
S21.7				37
S22.7			28,31	8,11
Not related		3, 35	39,15	19
Inappropriate terminology		36,37,38,39, 40	16,17,18,19, 20,27	7,21,22,23,24, 25

SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS

Description

The STEP Series II consists of four test booklets which measure achievement in General Science, Biology, Chemistry, and Physics. The tests appear to be appropriate to students from about grade 8 to grade 11, with similar content specifications in each test. Test 1A is at a higher grade level than test 4A.

The STEP test items, when appropriate, should measure the important objectives of Intermediate Science courses; items include all the cognitive domains.

The STEP Series II Science tests are presented in four booklets, forms 1A to 4A. Forms 1A and 2A each contain two tests, I and II, and this notation is preserved in the associated table of analysis; thus, 2AII refers to the second test found in form 2A.

Summary of Item Analysis

This section will be discussed in three parts consisting of form 1A with its two parts, form 2A with its two tests, and forms 3A and 4A taken together.

Form 1A

The unit concerning astronomy (E8) in the elementary panel is directly related to four items all found in test 1A I. A series of three questions deal with orbital motion (E8.2) and the fourth item relates to the earth (E8.3). Rock formations (E16.3) is directly related to a series of four questions in test 1A II. Three different items relate to the classification of living things (Unit E2), and all are in test 1A I. One item relates to four topics: classification of plant specimens (E2.5), fungi (E2.6), ferns (E2.8), and seed producers, while two items relate (one directly and one indirectly) to vertebrates (E2.11). Three items relate to weather, Unit E20, and again all are in test 1A I. One item relates directly to the physics of air (E20.2), and indirectly to measuring and recording atmospheric conditions (E20.5), and lightning (E20.8), with a second item relating directly to the latter topic.

The following elementary units are not referred to by items from form 1A: force and energy (E3), measurement (E5), adaptation and behaviour (E7), forestry resources (E9), life cycles (E11), light (E12), magnetism and electricity (E13), mining resources (E14), simple machines (E17), and solutions (E18).

At the secondary level measurement (Unit 56) is related to most often with seven items. Five of these relate (two directly, three indirectly) to speed (56.2) and are in test 1A II. The other items are in test 1A I with one item relating indirectly to length (56.1) and one relating directly to applications of density (56.12). Six items, all in test 1A I, refer to cells and their processes (Unit S1); two relate directly to diffusion and osmosis (51.8), two relate (one directly, and one indirectly) to cell physiology (51.4), one relates indirectly to cell theory (51.2) and one relates directly to cell structure (51.3). Six of seven items referring to viruses, monerans, and protists (Unit S22) relate to microbes and disease (S22.7) with five items from test 1A II relating directly and one item from test 1A I relating indirectly. Five items relate to Unit S19, solutions, with a series of three questions from test 1A II relating indirectly to solutions and mixtures (S19.1).

Form 1A does not contain any items which could be related to the following secondary units: consumer chemistry (S9), environmental chemistry (S12), human interaction with the biosphere (S15), machines (S16), separation of substances (S18), terrestrial and aquatic environments (S20), and vibrations and waves (S21). Twenty-one of the 75 items in form 1A could not be related to topics in the intermediate guidelines, and eight of these concerned topics that are taught in typical grade 12 chemistry courses.

Form 2A

As with the previous tests, the most commonly referred to unit in the elementary panel is astronomy (Unit E8). Three items from test 2A II relate directly to the earth (E8.3), two items from 2A I relate directly to the sun (E8.6), while the moon (E8.4) and other celestial bodies (E8.8) are each directly related to single items in test 2A I. Five items relate to the unit concerning the characteristics of living things (E1). Four of these are found in test 2A I and are all directly related to their topics: two to metabolism (E1.5), and one each to variety of organisms (E1.1) and reproduction (E1.4). Five different items relate to classification of living things (Unit E2). Two of these are from test 2A II and relate to classification systems (E2.2). The other items are from 2A I with need for classification (E2.1) and classification of plant specimens (E2.5) being referred to directly by one item each. The fifth question relates indirectly to two topics, invertebrates (E2.10) and vertebrates (E2.11). Heat and temperature (Unit E10) is referenced by four items. Two of three items relating to the boiling of water (E10.10) are from 2A II and do so directly, and the third item is from 2A I and relates indirectly to this topic. This last item also relates indirectly to the kinetic molecular theory (E10.11). The fourth item is also from 2A I and relates directly to the meaning of temperature (E10.5). Four items relate directly to fossil study (E16.6) with three of them appearing in test 2A II. Form 2A contains no items which could be related to the following elementary units: properties of matter (E6), forestry resources (E9), mining resources (E14), simple machines (E17), and solutions (E18).

In the secondary division, seven different items from form 2A relate to heat (Unit S5). Four are from test 2A I with two relating indirectly to the particle nature of matter (S5.5), and one each relating directly to thermal expansion (S5.1) and heat of vaporization of water (S5.12). The three items from 2A II relate directly, two of them referring to quantity of heat (S5.6) and the last to specific heat capacity (S5.8). Six different items relate to electricity and magnetism (Unit S11). Four are from test 2A II and all relate directly to electrostatics (S11.1), while one item from 2A I also relates directly to that topic and also to induction (S11.2). The sixth item appears in test 2A I and relates indirectly to electromagnetism (S11.9). Five items relate directly to the structure of matter (Unit S8), with a series of three items in test 2A II referring to elements and compounds (S8.8). The other two items are from test 2A I with one item relating directly to atomic theory (S8.3) and the other relating directly to the periodic table (S8.7). Four items relate to photosynthesis (S4.3), two each from test 2A I (one relating directly and one indirectly), and from 2A II where both relate indirectly. Three of four questions on measurement (Unit S6) are directly related to speed (S6.2), with two of them found in test 2A I. One item, also from 2A I, is indirectly related to the same topic. Four items relate indirectly to population growth (S15.4) and are from test 2A II. A series of four questions from test 2A II relate directly to force (S17.1). Three items from the same test relate directly to yeast (S13.3), with one item from 2A I relating indirectly to this topic and to characteristics of fungi (S13.1). Microbes and disease (S22.7) is directly related to four items from test 2A II. The following topics from the secondary panel were not matched with items from form 2A: cells and their processes (S1), consumer chemistry (S9), environmental chemistry (S12), machines (S16), separation of substances (S18), terrestrial and aquatic environments (S20), and vibrations and waves (S21). Eight items from test 2A I were not related to any topics in the intermediate guidelines, while all questions in 2A II could be related. Six of the eight questions relate to chemistry beyond the scope of the guidelines.

Forms 3A and 4A

These two tests are for lower grade levels than those preceding and there is a majority of questions relating to the biological sciences. Of the elementary units, nineteen different items relate directly to characteristics of living things (Unit E1). Fifteen of these are from test 4A with ten relating to a variety of organisms (E1.1), and one question also relates to movement and locomotion (E1.2). Two items refer to growth (E1.3), one refers to reproduction (E1.4), another to metabolism (E1.5) and the fifteenth relates to the cellular basis of life (E1.6). Three of the four items from test 3A which relate to this unit refer to metabolism (E1.5), and the fourth is concerned with irritability (E1.7). Nine different questions relate directly to classification of living things (Unit E2). Six of these questions are from test 4A and relate to informal biological classification (E2.3), with two of the items also relating to classification of plant specimens (E2.5). The three items from test 3A all relate to the latter topic, and one item also refers to ferns (E2.8). Four items from each test comprise the eight items which relate directly to plants (Unit #15). Three items from test 3A relate to classification of plants (E15.1), and the fourth refers to plant growth (E15.5]. Two questions from 4A relate to plants, one item refers to plant structures (E15.2), and one item relates to both seeds (E15.4) and plant growth. Astronomy (Unit E8) is directly referenced by seven different questions. Three relate to the earth (E8.3), two being from test 3A, and two relate to the moon (E8.4) with each test furnishing one item. Two questions from test 3A relate to the planets (E8.5), though one of these also referred to the earth. The seventh item, also from test 3A, relates to the stars (E8.7). Water (Unit E19) is directly related to six different items. Five of these are from test 3A with three relating, two indirectly, to the water cycle (E19.1) and one each of the indirect items also relating directly to the physics of water (E19.2) and water in weather (E19.7); a fourth question also relates directly to E19.2, and one question relates directly to water and living things (E19.5). One item from test 4A also relates directly to the latter topic. The following elementary units are each referenced by five different items: force and energy (E3) with four from test 4A, interdependence of living things (E4) with three from test 4A, and weather (E20) with all items appearing in test 4A. The following elementary units were not related to any items from tests 3A and 4A: measurement (E5), forestry resources (E9), and mining resources (E14).

In the secondary panel the unit which draws most questions is mechanics (S17) with nine items. Two of these are from test 3A with one each relating directly to the gravity-mass ratio (S17.2) and balanced forces (S17.5). Three items relate (two directly) to force (S17.1) while the following topics are each related to directly by single items: friction (S17.3), work (S17.8), and again, balanced forces. One item from 4A relates indirectly to unbalanced forces (S17.6). Eight different items relate to green plants (Unit S4). Absorption (S4.5) is indirectly related to one question from test 4A, but all other items relating to this unit do so directly. From test 3A, three items relate to the plant community (S4.1), one relates to photosynthesis (S4.3), and one to the ecological role of plants (S4.9). Two more items from test 4A relate to this unit; one refers to both photosynthesis and the role of green plants (S4.2) and the other relates to the leaf (S4.8). Functioning animals (Unit S3) are referenced by seven different items. Three of these are from test 3A, two relating directly and one indirectly to metabolism

(S3.1) with one item from 4A also relating directly to this topic. Two items from test 4A relate (one directly and one indirectly) to nutrition (S3.6), and one question from test 3A relates directly to food and energy (S3.7). Seven items relate directly to the structure of matter (Unit S8). Only one item is from test 4A and relates to the elements (S8.5). The six questions from test 3A are distributed as follows: three relate to the atomic theory (S8.3), two relate to elements and compounds (S8.8), and one refers to ions and conductivity (S8.4). Five different items refer to the units on chemical change (S2) and fungi and simple plants (S13). The following secondary topics were not related to any questions in tests 3A and 4A: consumer chemistry (S9), environmental chemistry (S12), human interaction with the biosphere (S15), machines (S16), and separation of substances (S18). Only three items from these tests were unmatched to any topics in the secondary guidelines, one from 3A and two from test 4A.

Table 36 Sequential Tests of Educational Progress
1AI and 1AII

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS .1	.2	.3	.4	.5	.6	.7	.8
IA1								
IAII								

NAME OF SUBTEST	E2 CLASSIFICATION .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
IA1											
IAII											

NAME OF SUBTEST	E3 FORCE AND ENERGY .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
IA1												
IAII												

NAME OF SUBTEST	E4 INTERDEPENDENCE .1	.2	.3	.4	.5	.7	.6	.8
IAI								1/
IAII								

NAME OF SUBTEST	E5 MEASUREMENT .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
IAI											
IAII											

NAME OF SUBTEST	E6 PROPERTIES OF MATTER .1	.2	.3	.4	.5	.6	.7	.8	.9	.10
IAI					2/					
IAII										

NAME OF SUBTEST	E7 ADAPTATION .1	.2	.3	.4	.5
IAI					
IAII					

NAME OF SUBTEST	E8 ASTRONOMY .1	.2	.3	.4	.5	.6	.7	.8	.9
IAI		3/	1/						
IAII									

NAME OF SUBTEST	E9 FORESTRY RESOURCES .1	.2	.3	.4	.5
IAI					
IAII					

NAME OF SUBTEST	E10 HEAT/TEMPERATURE .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
IAI											1/
IAII											

NAME OF SUBTEST	E11 LIFE CYCLES .1	.2	.3	.4	.5	.6	.7	.8
IAI								
IAII								

NAME OF SUBTEST	E12 LIGHT .1	.2	.3	.4	.5	.6
IAI						
IAII						

Table 36 Sequential Tests of Educational Progress
1AI and 1AII

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
I A I																							1/											
I A II																																		

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	
I A I	/1																																	
I A II			4/																															

NAME OF SUBTEST	E19 WATER										E20 WEATHER									E21 WISE USE OF ENERGY														
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
I A I					1/						1/	1/			/1			1/1																
I A II																																		

Table 36 Sequential Tests of Educational Progress
1AI and 1AII

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct/indirect

NAME OF SUBTEST	S1 CELLS								S2 CHEMICAL CHANGE								S3 ANIMALS						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7
1AI		/1	1/	1/1				2/			/1				1/								1/
1AII																							

NAME OF SUBTEST	S4 GREEN PLANTS										S5 HEAT												S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
1AI					1/	/1				1/					3/								/1											1/
1AII																								2/3										

NAME OF SUBTEST	S7 POPULATIONS											S8 MATTER								S9 CONSUMER CHEMISTRY							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8
1AI							1/							1/		1/		1/	1/								
1AII												1/															

NAME OF SUBTEST	S10 CONTINUITY								S11 ELECTRICITY/MAGNETISM										S12 ENVIRONMENTAL CHEMISTRY						
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7
1AI	1/1	1/				1/																			
1AII																							3/		2/

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Table 36 Sequential Tests of Educational Progress
1AI and 1AII

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
1 A I	1/								1/						1/							
1 A II																						

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION								
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9
1 A I													1/					1/	/1									
1 A II																												

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
1 A I		1/																												
1 A II																														

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
1 A I			(5 items - inappropriate terms)						(13 items - not related)
1 A II			(9 items - inappropriate terms)						(6 items - not related)

Table 36 Sequential Tests of Educational Progress
2AI and 2AII

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	E1 LIVING THINGS								E2 CLASSIFICATION											E3 FORCE AND ENERGY											
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
2AI				1/	2/				1/				1/					/1	/1										1/	1/	
2AII					/1					2/																					

NAME OF SUBTEST	E4 INTERDEPENDENCE								E5 MEASUREMENT											E6 PROPERTIES OF MATTER									
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
2AI				1/															1/										
2AII				1/																									

NAME OF SUBTEST	E7 ADAPTATION					E8 ASTRONOMY									E9 FORESTRY RESOURCES										
	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
2AI		1/	1/								2/		1/												
2AII								3/																	

NAME OF SUBTEST	E10 HEAT/TEMPERATURE											E11 LIFE CYCLES								E12 LIGHT					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6
2AI					1/					/1	/1	1/		/1										2/	
2AII										2/															

Table 36 Sequential Tests of Educational Progress
2AI and 2AII

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY													E14 MINING					E15 PLANTS					
	.1	.2	.3	.4	.5	.6	.7	8	.9	.10	.11	.12	.13	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6
2AI							1/	1/														1/		
2AII																						2/		

NAME OF SUBTEST	E16 ROCKS/MINERALS											E17 MACHINES										E18 SOLUTIONS							
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8
2AI		1/		1/		1/																							
2AII						3/																							

NAME OF SUBTEST	E19 WATER								E20 WEATHER									E21 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	
2AI	1/														/1	1/		
2AII																		

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Table 36 Sequential Tests of Educational Progress
2AI and 2AII

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	S1 CELLS .1	.2	.3	.4	.5	.6	.7	.8	S2 CHEMICAL CHANGE .1	.2	.3	.4	.5	.6	.7	.8	S3 ANIMALS .1	.2	.3	.4	.5	.6	.7
2AI									1/								2/						
2AII																	/1						

NAME OF SUBTEST	S4 GREEN PLANTS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	S5 HEAT .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	S6 MEASUREMENT .1	.2	.3	.4	.5	.6		.8	.9	.10	.11	.12
2AI			1/1								1/				/2							1/		2/1										
2AII			/2													2/		1/						1/										

NAME OF SUBTEST	S7 POPULATIONS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	S8 MATTER .1	.2	.3	.4	.5	.6	.7	.8	S9 CONSUMER CHEMISTRY .1	.2	.3	.4	.5	.6	.7	.8
2AI					1/				1/					1/				1/									
2AII				/2					1/										3/								

NAME OF SUBTEST	S10 CONTINUITY .1	.2	.3	.4	.5	.7	.6	.8	S11 ELECTRICITY/MAGNETISM .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	S12 ENVIRONMENTAL CHEMISTRY .1	.2	.3	.4	·5	·6	·7	·8	·9	·10	·11	·12
2AI	1/							1/	1/	1/							/1													
2AII									4/																					

Table 36 Sequential Tests of Educational Progress
2AI and 2AII

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS .1	.2	.3	.4	.5	.6	.7	.8	.9	S14 GEOMETRIC OPTICS .1	.2	.3	.4	.5	.6	.7	.8	S15 INTERACTION WITH BIOSPHERE .1	.2	.3	.4	.5
2AI	/1		/1		1/				/1							2/						
2AII			3/																		/4	

NAME OF SUBTEST	S16 MACHINES .1	.2	.3	.4	.5	.6	.7	.8	S17 MECHANICS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	S18 SUBSTANCE SEPARATION .1	.2	.3	.4	.5	.6	.7
2AI																										
2AII																										

NAME OF SUBTEST	S19 SOLUTIONS .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	S20 TERRESTIAL AND AQUATIC ENVIRONMENTS .1	.2	.3	.4	.5	.6	.7	.8	.9	S21 VIBRATIONS AND WAVES .1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
2AI		1/																												
2AII																														

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS .1	.2	.3	.4	.5	.6	.7	.8		S23 WISE USE OF ENERGY
2AI									(7 items - not related)	(8 items - inappropriate terms)
2AII							4/			(1 item - inappropriate terms)

Table 36 Sequential Tests of Educational Progress
3A and 4A

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

E1 LIVING THINGS

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8
3A					3/		1/	
4A	10/	1/	2/	1/	1/	1/		

E2 CLASSIFICATION

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
3A					3/			1/			
4A			6/		2/						

E3 FORCE AND ENERGY

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
3A				1/								
4A	2/					1/		2/				

E4 INTERDEPENDENCE

NAME OF SUBTEST	.1	.2	.3	.4	.5	.7	.6	.8
3 A		1/		2/				
4 A		1/		1/	1/	1/		

E5 MEASUREMENT

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
3 A											
4 A											

E6 PROPERTIES OF MATTER

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
3 A					1/					
4 A					1/					

E7 ADAPTATION

NAME OF SUBTEST	.1	.2	.3	.4	.5
3 A		1/			
4 A				2/	

E8 ASTRONOMY

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9
3 A			2/	1/	2/		1/		
4 A			1/	1/					

E9 FORESTRY RESOURCES

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
3 A										
4 A										

E10 HEAT/TEMPERATURE

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
3 A										1/	
4 A					1/						

E11 LIFE CYCLES

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7	.8
3 A					1/			
4 A							1/	1/

E12 LIGHT

NAME OF SUBTEST	.1	.2	.3	.4	.5	.6	.7
3 A							
4 A							

Table 36 Sequential Tests of Educational Progress
3A and 4A

GRADES 7 AND 8 – SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	2	.3	.4	.5	.6	.7	8	.9	.10	.11	12.	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
3 A	1/1					/1	1/																3/				1/							
4 A		1/	1/																				2/	1/		1/	1/							

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	
3 A					/1	1/																				1/								
4 A																	1/			1/											1/		/1	

NAME OF SUBTEST	E19 WATER										E20 WEATHER									E21 WISE USE OF ENERGY														
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
3 A	1/2	2/			1/		1/																											
4 A					1/						1/	3/	1/		1/																			

Table 36 Sequential Tests of Educational Progress
3A and 4A

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct/indirect

NAME OF SUBTEST	S1 CELLS										S2 CHEMICAL CHANGE										S3 ANIMALS															
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7									
3A				2/							2/1							1/			2/1						1/									
4A		1/	1/										1/				1/				1/					1/1										

NAME OF SUBTEST	S4 GREEN PLANTS											S5 HEAT													S6 MEASUREMENT											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10		.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12		.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
3A	3/		1/						1/					1/												2/							1/			
4A		1/	1/		/1			1/																								1/				

NAME OF SUBTEST	S7 POPULATIONS													S8 MATTER										S9 CONSUMER CHEMISTRY												
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8					
3A			1/		1/											3/	1/				2/															
4A			1/		1/													1/																		

NAME OF SUBTEST	S10 CONTINUITY										S11 ELECTRICITY/MAGNETISM														S12 ENVIRONMENTAL CHEMISTRY											
	.1	.2	.3	.4	.5	.7	.6	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10					.1	.2	.3	.4	.5	.6	.7	.8	.9	.10		
3A	1/						1/				1/							1/																		
4A	1/																	2/																		

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Table 36 Sequential Tests of Educational Progress
3A and 4A

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
3A				1/			1/	1/	2/			/2										
4A																						

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION								
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9
3A										1/			1/															
4A									2/1		1/		1/	/1		1/												

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	8	.9	10	1	.2	3	.4	.5	.6	.7	.8	.9	.1	2	.3	4	.5	6	.7	.8	.9	.10	.11
3A	1/		/1				1/					/1															1/2			
4A	1/				1/													/1						1/						

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS									S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8		
3A							1/		(2 items - not related)	(5 items - inappropriate terms)
4A							1/		(2 items - not related)	(6 items - inappropriate terms)

Table 36A

Test Analysis: Specific Items Related to Objectives

Sequential Tests of Educational Progress

Objective	Subtest	Item					
	Science						
		1AI	1AII	2AI	2AII	3A	4A
E1.1				36			2,23, 24,29, 32,33, 44,45, 46,47
E1.2							24
E1.3							7,38
E1.4		37		12			8
E1.5				17,35	(26)	8,9,34	17
E1.6							30
E1.7						2	
E2.1				1			
E2.2					1,2		
E2.3							11,12, 23,24, 32,33
E2.5		28		16		48,49, 50	11,12
E2.6		28					
E2.8		28				50	
E2.9		28					
E2.10				(36)			
E2.11		31,(34)		(36)			
E3.1							29,31
E3.4						14	
E3.6							14
E3.8							6,14
E3.10				24			
E3.11				24			
E4.1		(1)					
E4.2						34	21
E4.4				13	30	34,42	10
E4.5							22

Objective	Subtest	Item					
	Science						
		1AI	1AII	2AI	2AII	3A	4A
E4.7							10
E4.8		1					
E5.11				33			
E6.5		37,39				28	7
E7.2				15		16	
E7.3				14			
E7.4							44,46
E8.2		40,41,42					
E8.3		15			12,13,14	6,11	35
E8.4				30		12	36
E8.5						10,11	
E8.6				7,30			
E8.7						43	
E8.8				45			
E10.5				6			43
E10.10				(44)	6,7	24	
E10.11		19		(44)			
E11.1				12			
E11.3				(12)			
E11.5						15	
E11.7							2
E11.8							39
E12.5				31,32			
E13.1						19	18
E13.2							42
E13.3							42
E13.6						(19)	
E13.7				20		44	
E13.8				20			
E15.1		28				48,49,50	11,12
E15.2							15
E15.4				2	9,10		7
E15.5						41	7

Objective	Subtest	Item					
	Science						
		1A1	1A11	2AI	2AII	3A	4A
E16.1		(3)					
E16.2				42			
E16.3			2,3,4,5				
E16.4				41			
E16.5						(50)	
E16.6				25	3,4,5	13	
E17.4							14
E17.7							37
E18.1						33	
E18.6							1
E18.8						(33)	
E19.1				10		4,(1),(26)	
E19.2						1,24	
E19.5		2				21	19
E19.7						26	
E20.1		15					13
E20.2		9					48,49,50
E20.3							48
E20.5		(9)					28
E20.7				(19)			
E20.8		8,(9)		5			
S1.2		(37)					30
S1.3		14					27
S1.4		25,(39)				21,22	
S1.8		5,35					
S2.1				43		7,37 (28)	
S2.3		(4)					9
S2.7		17					16
S2.8						28	
S3.6							3,(38)
S3.1				17,35	(26)	8,9,(34)	17
S3.7		24				18	

Objective	Subtest	Item					
	Science						
		1AI	1AII	2AI	2AII	3A	4A
S4.1						48,49, 50	
S4.2							22
S4.3				11,(16)	(9),(10)	27	22
S4.5		2					(15)
S4.6		(5)					
S4.8							41
S4.9						34	
S4.10		1					
S5.1				6			
S5.3						1	
S5.5		5,18,19		(22), (44)			
S5.6					6,7		
S5.8					8		
S5.12				8			
S6.1		(4)					
S6.2			12,13, (10), (11), (14),	9,33, (34)	11	29,30	
S6.8							40
S6.9						17	
S6.12		9					
S7.3						34	21
S7.4					(28), (29)		
S7.5				13		42	10
S7.7		27					
S7.9				13	30		
S8.1			1				
S8.3		11		21		45,46 47	
S8.4						5	
S8.5		3					34
S8.7		7		37			

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Objective	Subtest	Item					
	Science	1AI	1AII	2AI	2AII	3A	4A
S8.8		3			15,16 17	35,37	
S10.1		20(38)		12		15	8
S10.2		32					
S10.6						3	
S10.7		13					
S10.8				27			
S11.1				20	22,23, 24,25	44	
S11.2				20			
S11.5			24,25, 26				
S11.7			24,25				
S11.8						19	18,42
S11.9				(3)			
S13.7						27	
S13.1		28		(16)			
S13.3				(16)	27,28, 29		
S13.4						49	
S13.5				28			
S13.8						27	
S13.9		28		(16)		27,50	
S14.3						(38)(39)	
S14.6		26					
S14.7				31, 32			
S15.4					(27)(28) (29)(30)		

Objective	Subtest Science					
	1A I	1A II	2A I	2A II	3A	4A
S17.1				22,23,24, 25		(6),29,31
S17.2					14	
S17.3						37
S17.5	10				32	25
S17.6						(50)
S17.8						14
S17.10	24					
S17.11	(18)					
S19.1		(15),(16)(17)			33	1
S19.2	5		22			
S19.3					(36)	
S19.5		23				1
S19.7					31	
S20.2					(36)	
S20.8						(19)
S21.5						20
S21.8					38,(39) (40)	
S22.4	33					
S22.7	(13)	1,6,7,8,9		18,19,20, 21	23	26

No objectives relate to the following items:

1A I:
6, 12, 16, 21, 22, 23, 29, 30, 36, 43, 44, 45

1A II:
18, 19, 20, 21, 22, 27, 28, 29, 30

2A I:
14, 18, 23, 26, 29, 38, 39, 40

3A:
25

4A:
4, 5.

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Objective	Subtest	Item					
	Science						
		1AI	1AII	2AI	2AII	3A	4A
Inappropriate terminology		6,12,16, 22,31	2,3,4, 5,10, 11,12, 13,14	4,6,9, 21,33, 38,39, 40	17	10,11, 29,30, 41	11,12, 20,28, 31,40

STANFORD ACHIEVEMENT TEST

Description

The Stanford Achievement Test is a series of comprehensive achievement tests developed to provide measurement and assessment of learning at different levels of the educational process.

Advanced Level Complete is primarily designed for use from the beginning of grade 7 to the middle of grade 9. It includes nine tests in a single 32-page booklet: Vocabulary, Reading Comprehension, Mathematics Concepts, Mathematics Computation, Mathematics Applications, Spelling, Language, Social Science, Science.

The Science Test measures the pupil's ability to understand basic concepts which reflect the natural and physical sciences. The test consists of 60 items in which the pupil must choose the correct answer from among four alternatives. Ten basic concepts and skills are measured at this level: matter, energy, change in the physical universe, the effect of heredity and environment upon living objects, the environmental interaction of living objects, the interdependence of living objects, the basic processes of science (e.g., predicting, classifying, inferring), the basic measurement skills of science, the functional processes of science (e.g., controlling variables in an experiment), and the functional skills of science (e.g., estimating).

Summary of Item Analysis

The 60 items which comprise the science subtest of the Stanford achievement battery cover units in both the physical and biological sciences. In the elementary panel, nine items refer to force and energy (Unit E3), seven of these (2 directly and 5 indirectly) relate to energy conversion (E3.11) and two relate indirectly to kinetic energy (E3.9). Five items relate directly to characteristics of living things (Unit E1), four of these being to growth (E1.3) and the other to the cellular basis of life (E1.6). Three of five items referring directly to the classification of living things (Unit E2) relate to informal biological classification (E2.3), one to formal biological classification (E2.4) and one to vertegrates (E2.11). Plants (Unit E15) are referred to directly in five items; one question relates to seeds (E15.4) and four relate to plant growth (E15.5). Two of four items relating directly to the interdependence of living things (Unit E4) refer to producers, consumers, and food chains (E4.4) and the other two relate to photosynthesis and respiration (E4.5). Four items relate directly to weather (Unit E20), one item relates to both water in the atmosphere (E20.3) and characteristics of precipitation, while nature of the atmosphere (E20.1), physics of air (E20.2), and clouds (E20.6) are related to by one question each. Units not referred to at the elementary level are properties of matter (E6), adaptation and behaviour (E7), forestry resources (E9), mining resources (E14), simple machines (E17), and solutions (E18).

In the secondary panel, six items refer directly to vibrations and waves (Unit S21), five of these relating to pendulums (S21.4) and one to qualitative aspects of vibrations (S21.2). The structure of matter (Unit S8) is related to directly by four items, two each referring to atomic theory (S8.3) and elements and compounds (S8.8). Three of four items relating to electricity and magnetism (Unit S11) refer to electric circuits and one item to electric energy. In mechanics (Unit S17), one question relates directly to force (S17.1) and balanced forces (S17.5), and a further three items (two directly and one indirectly) also relate to the latter topic.

Units in the secondary panel not referred to by items in this test are consumer chemistry (S9), environmental chemistry (S12), fungi and simple plants (S13), human interaction with the biosphere (S15), machines (S16), separation of substances (S18), solutions (S19), and terrestrial and aquatic environments (S20).

Only two items in this could not be related to topics in the Intermediate Guidelines. One concerned electromagnetic waves and the second was on human physiology.

Table 37 Stanford Achievement Test

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST

E1 LIVING THINGS

.1	.2	.3	.4	.5	.6	.7	.8
		4/			1/		

E2 CLASSIFICATION

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
		3/	1/							1/

E3 FORCE AND ENERGY

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
								/2		2/5	

NAME OF SUBTEST

E4 INTERDEPENDENCE

.1	.2	.3	.4	.5	.7	.6	.8
			2/	2/			

E5 MEASUREMENT

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
										3/

E6 PROPERTIES OF MATTER

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10

NAME OF SUBTEST

E7 ADAPTATION

.1	.2	.3	.4	.5

E8 ASTRONOMY

.1	.2	.3	.4	.5	.6	.7	.8	.9
		1/	1/					

E9 FORESTRY RESOURCES

.1	.2	.3	.4	.5

NAME OF SUBTEST

E10 HEAT/TEMPERATURE

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
					1/					1/

E11 LIFE CYCLES

.1	.2	.3	.4	.5	.6	.7	.8
				2/			

E12 LIGHT

.1	.2	.3	.4	.5	.6
					1/

Table 37 Stanford Achievement Test

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	5	.6						
											3/															1/	4/							

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	6	7	8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	3	.4	.5	6	7	8	
				2/		1/																												

NAME OF SUBTEST	E19 WATER										E20 WEATHER									E21 WISE USE OF ENERGY														
	1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
						1/	1/				1/	1/	1/	1/		1/																		

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Table 37 Stanford Achievement Test

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST

S1 CELLS

.1	.2	.3	.4	.5	.6	.7	.8
	2/			1/			

S2 CHEMICAL CHANGE

.1	.2	.3	.4	.5	.6	.7	.8
1/							

S3 ANIMALS

.1	.2	.3	.4	.5	.6	.7
	1/1			1/		

NAME OF SUBTEST

S4 GREEN PLANTS

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
	1/	2/							

S5 HEAT

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
	1/			1/							

S6 MEASUREMENT

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
	3/										

NAME OF SUBTEST

S7 POPULATIONS

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
				2/						

S8 MATTER

.1	.2	.3	.4	.5	.6	.7	.8
		2/					2/

S9 CONSUMER CHEMISTRY

.1	.2	.3	.4	.5	.6	.7	.8

NAME OF SUBTEST

S10 CONTINUITY

.1	.2	.3	.4	.5	.7	.6	.8
2/							1/

S11 ELECTRICITY/MAGNETISM

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
	1/					3/			

S12 ENVIRONMENTAL CHEMISTRY

.1	.2	.3	.4

Table 37 Stanford Achievement Test

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct/indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
																	1/					

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
									1/				3/1													

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	3	.4	.5	.6	7	.8	.9	10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
																					1/		5/							

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
		1/		1/	1/			1/	(2 items - not related; 12 items - inappropriate terms)

Table 37A

Test Analysis: Specific Items Related to Objectives

Stanford Achievement Test

Objective	Subtest	Item
	Science	
E1.3		26, 27, 28, 29
E1.6		13
E2.3		42, 43, 44
E2.4		30
E2.11		59
E3.9		(3), (4)
E3.11		2, 15, (33), (34), (35), (36), (37)
E4.4		21, 46
E4.5		1, 18
E5.11		6, 7, 8
E8.3		25
E8.4		58
E10.6		55
E10.11		14
E11.5		53, 54
E12.6		23
E13.11		49, 50, 51
E15.4		19
E15.5		26, 27, 28, 29
E16.4		38, 45
E16.6		5
E19.6		45
E19.7		56
E20.1		56
E20.2		47
E20.3		60
E20.4		60
E20.6		9
S1.2		13, 48
S1.5		16
S2.1		17

Objective	Subtest	Item
	Science	
S3.2		44, (10)
S3.5		22
S4.2		1
S4.3		1, 18
S5.2		55
S5.5		14
S6.2		6, 7, 8
S7.5		21, 46
S8.3		11, 39
S8.8		20, 31
S10.1		53, 54
S10.8		52
S11.6		2
S11.7		49, 50, 51
S14.8		23
S17.1		3
S17.5		3, (4), 40, 41
S21.2		15
S21.4		33-37
S22.2		32
S22.4		32
S22.5		57
S22.8		48
Not related		12, 24
Inappropriate terminology		3, 4, 6, 7, 8. 26, 33 34, 35, 36, 37, 41

TESTS OF ACADEMIC PROGRESS

Description

The Tests of Academic Progress are designed to provide an efficient and comprehensive appraisal of student progress towards widely accepted academic goals of secondary-school education. The battery comprises six tests: Social Studies, Composition, Science, Reading, Mathematics, and Literature.

Each test in the battery was designed to measure the extent to which the objectives of a basic area of high school instruction have been achieved.

The Tests of Academic Progress are published in a form which allows convenient administration. A single, reusable test booklet contains all six area tests for grades 9 through 12. The complete test in a given area is composed of four different, but overlapping, grade-level tests. For example, grade 10 overlaps from about grade 8.5 to 11.5, and is covered by questions 21-80 inclusive. In this study the first 80 questions were evaluated although only the first 40 questions would normally be answered by students in grades 9 and 10.

Summary of Item Analysis

The eighty items evaluated as part of the TAP science subtest cover a number of units of biological and physical science study. In the elementary panel, seven of nine items which refer directly to astronomy (Unit E8) relate to the earth (E8.3), with the moon (E8.4) and the stars (E8.7) being related to one item each. Rocks and minerals

(Unit E16) comprised the next largest item category with two items relating directly to rock classification (E16.2), two items (one directly, and one indirectly) relate to rock formations (E16.3), while erosion and weathering (E16.4) and fossil study (E16.6) are related to one item each. Five items refer to weather (Unit E20), three (two directly and one indirectly) relate to physics of air (E20.2), and water in the atmosphere (E20.3) and clouds (E20.6) are related to directly by one item each. Four questions relate to characteristics of living things (Unit E1), one item relating indirectly to variety of organisms (E1.1) while the following topics are referred to directly by one item each: movement and locomotion (E1.2), reproduction (E1.4), and metabolism (E1.5). Two of four items relating to the interdependence of living things (Unit E4) refer directly to producers, consumers, and food chains (E4.4); one item refers directly to photosynthesis and respiration (E4.5) and one indirectly to disturbance of balance (E4.7). Water (Unit E19) is referred to directly by four items, three of these relating to the water cycle (E19.1), and the fourth to water as a land-changer (E19.6). Units which are not related to in the elementary division by items in this subtest are: classification of living things (E2), force and energy (E3), measurement (E5), adaptation and behaviour (E7), forestry resources (E9), light (E12), magnetism and electricity (E13), mining resources (E14), simple machines (E17), and solutions (E18).

In the secondary panel fourteen items are related to continuity (Unit S10). Seven of these items relate (six directly and one indirectly) to reproduction in plants and animals (S10.1), six relate directly to chromosome theory (S10.8), and one of those also relates directly to human genetics (S10.6) while one item relates directly to DNA and the genetic code (S10.3). Four items relate to heat (Unit S5): two items relate (one directly and one indirectly) to the particle nature of matter (S5.5), and heat transfer (S5.2), and changes of state (S5.3) are referred to directly by one question each. The unit on viruses, monerans, and protists (S22) is directly related to in four different items. Two items refer to monerans (S22.2), and one of those questions also relates to bacteria in the laboratory (S22.6) while the other item also relates to microbes and disease (S22.7). In addition, the latter topic related to two more items. Five items relate directly to green plants (Unit S4); three of these refer to the leaf (S4.8), while the role of green plants (S4.2) and photosynthesis (S4.3) are related to by one question each. The unit on functioning animals (S3.5) is referred to directly by four items, three of these relate to the digestive system (S3.5) and the fourth to breathing systems (S3.2).

Eleven items are not related to the topics in the Intermediate Guidelines. Four items deal with human physiology, four items relate to chemistry topics beyond the scope of these guidelines, two questions deal with geological science, and one question relates to boiling point depression.

Table 38 Tests of Academic Progress

GRADES 7 AND 8 — SCIENCE OBJECTIVES

Code: direct/indirect

NAME OF SUBTEST	E1 LIVING THINGS								E2 CLASSIFICATION											E3 FORCE AND ENERGY											
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
	/1	1/		1/	1/																										

NAME OF SUBTEST	E4 INTERDEPENDENCE								E5 MEASUREMENT											E6 PROPERTIES OF MATTER									
	.1	.2	.3	.4	.5	.7	.6	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
				2/	1/	/1																			1/				

NAME OF SUBTEST	E7 ADAPTATION					E8 ASTRONOMY									E9 FORESTRY RESOURCES				
	.1	.2	.3	.4	.5	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5
								7/	1/			1/							

NAME OF SUBTEST	E10 HEAT/TEMPERATURE											E11 LIFE CYCLES								E12 LIGHT					
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6
								1/					1/	1/		1/									

Table 38 Tests of Academic Progress

GRADES 7 AND 8 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct/indirect

NAME OF SUBTEST	E13 MAGNETISM/ELECTRICITY															E14 MINING							E15 PLANTS											
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12	.13			.1	.2	.3	.4	.5			.1	.2	.3	.4	.5	.6						
																								1/	1/		/1							

NAME OF SUBTEST	E16 ROCKS/MINERALS													E17 MACHINES												E18 SOLUTIONS								
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11			.1	.2	.3	.4	.5	.6	.7	.8	.9	.10			.1	.2	.3	.4	.5	.6	.7	.8	
		2/	1/1	1/		1/																												

NAME OF SUBTEST	E19 WATER										E20 WEATHER									E21 WISE USE OF ENERGY														
	.1	.2	.3	.4	.5	.6	.7	.8			.1	.2	.3	.4	.5	.6	.7	.8	.9															
	3/					1/						2/1	1/			1/																		

Table 38 Tests of Academic Progress

GRADES 9 AND 10 — SCIENCE OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST

S1 CELLS

.1	.2	.3	.4	.5	.6	.7	.8
		1/		2/			

S2 CHEMICAL CHANGE

.1	.2	.3	.4	.5	.6	.7	.8
3/	1/						

S3 ANIMALS

.1	.2	.3	.4	.5	.6	.7
	1/			3/		

NAME OF SUBTEST

S4 GREEN PLANTS

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
	1/	1/					3/		

S5 HEAT

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.12
	1/	1/		1/1							

S6 MEASUREMENT

.1	.2	.3	.4	.5	.6	.8	.9	.10	.11	.12

NAME OF SUBTEST

S7 POPULATIONS

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
	1/			2/						

S8 MATTER

.1	.2	.3	.4	.5	.6	.7	.8
		2/		1/			1/

S9 CONSUMER CHEMISTRY

.1	.2	.3	.4	.5	.6	.7	.8

NAME OF SUBTEST

S10 CONTINUITY

.1	.2	.3	.4	.5	.6	.7	.8
6/1		1/			1/		6/

S11 ELECTRICITY/MAGNETISM

.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
1/									

S12 ENVIRONMENTAL CHEMISTRY

.1	.2	.3	.4

Table 38 Tests of Academic Progress

GRADES 9 AND 10 — SCIENCE OBJECTIVES (CONTINUED)

Code: direct / indirect

NAME OF SUBTEST	S13 SIMPLE PLANTS									S14 GEOMETRIC OPTICS								S15 INTERACTION WITH BIOSPHERE				
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5
		2/	1/	1/																		

NAME OF SUBTEST	S16 MACHINES								S17 MECHANICS											S18 SUBSTANCE SEPARATION						
	.1	.2	.3	.4	.5	.6	.7	.8	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11	.1	.2	.3	.4	.5	.6	.7
														1/									1/			

NAME OF SUBTEST	S19 SOLUTIONS										S20 TERRESTIAL AND AQUATIC ENVIRONMENTS									S21 VIBRATIONS AND WAVES										
	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.1	.2	.3	.4	.5	.6	.7	.8	.9	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10	.11
							1/						1/						1/											

NAME OF SUBTEST	S22 VIRUSES, MONERANS, AND PROTISTS								S23 WISE USE OF ENERGY
	.1	.2	.3	.4	.5	.6	.7	.8	
		2/				1/	3/		(11 items - not related; 10 items - inappropriate terms)

Table 38A

Test Analysis: Specific Items Related to Objectives

Tests of Academic Progress--Form S

Objective	Subtest	Item
	Science	
E1.1		(4)
E1.2		46
E1.4		27
E1.5		4
E4.4		49, 69
E4.5		24
E4.7		(1)
E6.6		43
E8.3		9, 10, 11, 12, 13, 14, 36
E8.4		58
E8.7		60
E10.8		45
E11.2		54
E11.3		53
E11.5		26
E15.2		25
E15.3		26
E15.5		(1)
E16.2		37, 38
E16.3		8, (7)
E16.4		61
E16.6		55
E19.1		15, 37, 38
E19.6		40
E20.2		57, 77, (35)
E20.3		15
E20.6		77
S1.3		68
S1.5		28, 73
S2.1		16, 17, 64

Objective	Subtest	Item
	Science	
S2.2		16
S3.2		30
S3.5		31, 32, 56
S4.2		49
S4.3		24
S4.8		21, 22, 23
S5.2		45
S5.3		15
S5.5		19, (41)
S7.2		51
S7.5		49, 69
S8.3		62, 78
S8.5		42
S8.8		42
S10.1		26, 27, 28, 29, 53, 54, (50)
S10.3		66
S10.6		75
S10.8		70, 71, 72, 73, 74, 75
S11.1		43
S17.6		20
S13.2		47, 48
S13.3		48
S13.4		48
S22.2		5, 67
S22.6		67
S22.7		3, 5, 6
S18.4		18
S19.7		41
S20.3		51
S20.9		2
Not related		33, 34, 39, 44, 52, 59, 63, 65, 76, 79, 80
Inappropriate terminology		2,15, 18, 44, 59, 60, 62, 63, 65,78

SUMMARY OF ITEM ANALYSIS IN SCIENCE

A few content areas were measured by a large number of test items. At the elementary level the most frequently related objectives were astronomy (E8), rocks and minerals (E16), weather (E20), and interdependence (E4). At the secondary level the number of test items was significantly smaller, yet the most frequently related objectives were matter (S8), electricity/magnetism (S11), geometric optics (S14), and viruses, monerans, and protists (S22).

Many content areas were not measured by any, or by very few, test items. At the elementary level the areas not measured were measurement (E5), properties of matter (E6), adaptation (E7), forestry resources (E9), heat/temperature (E10), light (E12), mining (E14), machines (E17), solutions (E18), water (E19), and the wise use of energy (E21). At the secondary level the areas not measured were animals (S3), measurement (S6), populations (S7), consumer chemistry (S9), continuity (S10), interaction with biosphere (S15), substance separation (S18), terrestrial and aquatic environments (S20), and vibrations and waves (S21).

Three tests stand out from the 11 tests analysed as being most comprehensive in the number of content areas related to test items. These are the Cooperative Science Tests, the Sequential Tests of Educational Progress, and the SRA Assessment Survey. These three tests taken together relate to most of the content areas in the guidelines. Also, the Metropolitan Achievement Test measures a good number of objectives but is not as comprehensive as the three above.

The rest of the Science tests measure only a few objectives and usually in a particular area. For example, the Dubins Earth Science Test deals with astronomy (E8), rocks and minerals (E16), and weather (E20).

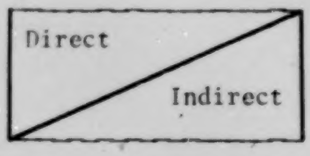
A good number of test items in each test were found to be unrelated to any objective. In many cases where an item has been stated as using "inappropriate terminology", this is due to the use of non-SI units. A second major cause of placing items in the category of "inappropriate terminology" was the use of American spelling. It is important, however, to point out that many of the items labelled "inappropriate terminology" are very good test items which could be adapted readily to the Ontario Science curriculum.

6 Results: Item Analysis for History

PROCEDURE FOR ITEM ANALYSIS

The items of each standardized test were examined to determine the knowledge and skills a child would need to know in order to respond correctly to each item. The History specialists, who did the analysis and who had helped develop the new guidelines, then asked "Which objectives in the new History guideline would enhance the child's ability to answer the item correctly?"

Within those objectives related to a particular test item, some have far greater significance than others. However, this analysis does not attempt to give a rank ordering of the significance of related objectives. Instead, the analysis uses a bi-polar distinction between those objectives *directly* related to a test item and those objectives *indirectly* related to the same test item. The total number of items directly related to an objective are entered on the top of the diagonal and the number on the bottom of the diagonal indicates the total number of indirect items related to an objective. This format is illustrated below.



The results of the item analysis for each standardized test are tabulated in two forms. The first form is a summary chart which displays visually the general areas being measured by the test items. In the summary chart the total number of items both directly and indirectly related to the objectives are listed using the format described above.

The second form is a table which identifies by the actual number of the test item the specific items related to each objective. In these tables, the items which are indirectly related to an objective are enclosed in brackets (   ).

HISTORY OBJECTIVES IN THE INTERMEDIATE DIVISION

Aims

The aims of the Intermediate Division history program are:

1. to develop an understanding of the Canadian identity and societal goals;
2. to develop an understanding of the roots of Canada's cultural heritage;
3. to develop a reasoned pride in Canada;
4. to develop an understanding of civic responsibility;
5. to develop an understanding of fundamental concepts central to the human experience, such as justice, change, diversity, order, individualism, the common good, worth of the individual, concern for others, dignity of labour, tradition, culture;
6. to develop the ability to imaginatively recreate the past;
7. to develop an awareness of the contributions of both women and men of all ages and groups to the development of our country;
8. to develop the ability to distinguish fact from opinion, to detect bias, to formulate a hypothesis, to evaluate and interpret evidence, to synthesize, to speculate, to make judgments;
9. to develop an awareness of values and of value alternatives;
10. to develop research skills, including library skills, interviewing skills, and the ability to draw and select information from non-print as well as print resources;
11. to develop communication skills such as those used in recording information, in listening, and expressing ideas clearly and precisely in written, oral, and visual form.

I. Grades 7 and 8

General Objectives

1. To develop an understanding of the lives of people who immigrated to and settled in Canada: their reasons for emigrating; their settlement patterns; their differing problems and hardships; their social and cultural lives;
2. to develop an understanding of the achievement of Confederation: the concerns that existed; the significant events; the influence of various personalities;
3. to develop an understanding of Canada's post-Confederation expansion from sea to sea: railways, people, law, wheat, oil;
4. to understand that the development of Canada has been affected by people, events, and ideas in the United States;
5. to appreciate that social and economic stress has contributed to change throughout Canadian history;
6. to develop skills, concepts, and values as indicated in the aims for the Intermediate Division history program (see Aims, p. 6).

Core Content Areas

The following content areas must be incorporated into courses developed for grades 7 and 8.

- Canada's original peoples
- Life in New France
- Life in Upper Canada
- The opening of the West
- The United Empire Loyalists and the American Revolution
- Rebellions: 1837, Upper and Lower Canada; 1870, 1885, Northwest Territories
- Confederation
- Social reform: trade unionism, women's suffrage

II. Grades 9 and 10

General Objectives

1. To develop an understanding of the Canadian political and legal systems;
2. to develop an appreciation of the rights and responsibilities of citizens in Canadian society;

3. to analyse in historical perspective and in terms of future implications contemporary issues of concern to Canadians both as citizens of Canada and of the world community;
4. to develop an appreciation of the ways in which the arts contribute to an understanding of contemporary issues in Canadian society;
5. to develop skills, concepts, and values as indicated in the aims outlined for the Intermediate Division History program (see Aims p.6).

Core Content Areas

The objectives outlined above are to be achieved through the following core content areas:

Government and Law in Canada
Contemporary Issues

Government and Law in Canada. This core content area will provide opportunities for students:

1. to understand that people living in groups need some form of political structure and authority to provide order and to meet their needs;
2. to understand that government in a democratic society attempts to provide a balance between the common good and the freedom and rights of individuals;
3. to appreciate the need for balance between individual freedom and responsibility in our democratic society;
4. to understand that personal and political positions and decisions are based on needs, values, beliefs, and traditions;
5. to recognize that each person has a responsibility to participate in public life and can influence change, at the same time acknowledging that individuals are more likely to influence the decision-making process when working in groups than when working alone;
6. to understand that three levels of government and international cooperation are needed to meet some of the differing needs of people in Canada and the world.
7. to understand the structure, role, and function of the legislature, executive, judiciary, and civil service in our systems of government;
8. to appreciate that rules and laws are important for individuals and for society as a whole;
9. to understand the process by which laws and by-laws are made and changed;

10. to recognize that existing laws require continual examination to ensure that they meet the needs of people in our society;
11. to understand that inherent in our system of government are concepts of representation, responsibility, the common good, federalism, majority rule and minority rights, and citizenship.

Contemporary Issues. This core content area will provide opportunities for students:

1. to recognize that various events, issues, and areas of concern, however different, are nevertheless related;
2. to understand that contemporary issues have roots in the past (a starting point and significant manifestations through time), a present focus, and implications for the future;
3. to develop and use an appropriate process for analysing issues.

Canada's Multicultural Heritage

Specific Objectives

In addition, a course developed from Canada's Multicultural Heritage must provide opportunities for students to meet these more specific objectives:

1. to develop an understanding and appreciation of the British roots of our Canadian political system;
2. to develop an understanding and appreciation of the French and British roots of our Canadian legal system;
3. to understand that any group brings its technology (machinery, tools, processes, techniques, etc.) to the new environment, that this technology is influenced by the new environment and by an existing culture, and that it in turn alters the existing culture;
4. to appreciate the contributions of Canada's original peoples to our changing attitudes to land and other resources;
5. to understand that wherever people live they develop forms of artistic expression such as painting, dance, photography, architecture, and athletics, and that these forms of artistic expression are influenced by the environment;

6. to understand that when people move to a new environment they take their forms of artistic expression with them; that in some cases these remain unchanged, in other cases they are modified by the existing culture and/or modify the existing culture;
7. to appreciate that a diversity of art forms enriches the Canadian experience;
8. to understand that customs and traditions (festivals, religious holidays, traditional dishes, etc.) help a cultural group to maintain its identity;
9. to appreciate that a diversity of lifestyles enriches the Canadian experience;
10. to understand that any group brings its lifestyle to the new environment, that this lifestyle is influenced by the new environment and any existing culture, and that it alters any such culture.

TESTS IN HISTORY

The 8 tests with items related to History are listed below:

Canadian Tests of Basic Skills
Cooperative Social Studies Tests
Iowa Tests of Educational Development
Metropolitan Achievement Tests
SRA Assessment Survey
Sequential Tests of Educational Progress
Stanford Achievement Test
Tests of Academic Progress

CANADIAN TESTS OF BASIC SKILLS-- FORM 4M

Description

The Canadian Tests of Basic Skills provide for the measurement of skills involved in reading, language, work-study, and mathematics. The skills represented in the tests are crucial in the educational development of pupils and largely determine the extent to which they can profit from later instruction.

The skills measured by the Canadian Tests of Basic Skills are classified into five major areas: vocabulary, reading, language, work-study, and mathematics. A single comprehensive test is provided in each of the first two areas. Separate subtests are provided for each of four aspects of language development: spelling, capitalization, punctuation, and usage. Three subtests in the work-study area are concerned with map reading, reading graphs and tables, and knowledge and use of references.

Each test is continuous, covering the range of achievement development in the elementary school.

Two subtests which are related to some of the History objectives are Reading Graphs and Tables and Knowledge and Use of Reference Materials.

Results of Item Analysis

In the Reading Graphs and Tables subtest 51 items are directly related and 5 items are indirectly related to the general aim of "evaluating and interpreting evidence, drawing conclusions based on evidence, synthesizing, and making judgments". This is aim 8 in the list of general objectives and the same test items relate to objective 6 for grades 7 and 8 and objective 5 for grades 9 and 10.

In the Knowledge and Use of Reference Materials subtest 85 items are directly related and 50 items are indirectly related to general aim 5 "evaluating and interpreting evidence". These same items are related to objective 6 for grades 7 and 8 and objective 5 for grades 9 and 10.

Table 39 Canadian Tests of Basic Skills

HISTORY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	AIMS FOR THE INTERMEDIATE DIVISION 1	2	3	4	5	6	7	8	9	10	11
Graphs & Tables								51/5			
Ref. Materials										85/50	

NAME OF SUBTEST	GRADES 7 AND 8 OBJECTIVES						CORE CONTENT AREAS							
	1	2	3	4	5	6	1	2	3	4	5	6	7	8
Graphs & Tables						51/5								
Ref. Materials						85/50								

NAME OF SUBTEST	GRADES 9 AND 10 OBJECTIVES					CORE CONTENT AREAS GOVERNMENT AND LAW											CONTEMPORARY ISSUES		
	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11	1	2	3
Graphs & Tables					51/5														
Ref. Materials					85/50														

NAME OF SUBTEST	CANADA'S MULTICULTURAL HERITAGE OBJECTIVES 1	2	3	4	5	6	7	8	9	10	
Graphs & Tables											(18 items are not related)
Ref. Materials											(16 items are not related)

Table 39A

Test Analysis: Specific Items Related to Objectives

Canadian Tests of Basic Skills--Metric Edition

Form 4M

Objective	Subtest	Item
	Reading Graphs and Tables	
General Aims		
8		1-28, 37-40, 52-56, 61-74, (47-51)
Grade 7 & 8 General		
6		1-28, 37-40, 52-56, 61-74, (47-51)
Grade 9 & 10 General		
5		1-28, 37-40, 52-56, 61-74, (47-51)
Multiculturalism General		
3		1-28, 37-40, 52-56, 61-74, (47-51)
Not related		29, 30, 31, 32, 33, 34, 35, 36, 41, 42, 43, 44, 45, 46, 57, 58, 59, 60
	Knowledge and Use of Reference Material	
General Aims		
10		7-14, 27-50, 61-66, 83-129, (15-26), (51-60), (67-82), (130-141)
Grade 7 & 8 General		
6		7-14, 27-50, 61-66, 83-129, (15-26), (51-60), (67-82), (130-141)
Grade 9 & 10 General		
5		7-14, 27-50, 61-66, 83-129, (15-26), (51-60), (67-82), (130-141)

Objective	Subtest	Item
Multiculturalism General		
3		7-14, 27-50, 61-66, 83-129, (15-26), (51-60), (67-82), (130-141)
Not related		1-6, 108-117

COOPERATIVE SOCIAL STUDIES TESTS--FORM A

Description

The Cooperative Social Studies Tests measure achievement in seven major areas of the junior-senior high school social studies curriculum: American History (Junior High School); Civics; World History; American History (Senior High School); Modern European History; American Government; and Problems of Democracy. Achievement is assessed in terms of knowledge and understanding of events, issues, and ideas; application of knowledge in generalizing principles and concepts; analysis and evaluation of cause and effect relationships; and ability to use the accessories of the social sciences--graphs, maps, charts, cartoons, etc.

The World History and Modern European History tests provide general measures of student comprehension of these subjects. The World History and Modern European History tests provide general measures of student comprehension of these subjects. The World History test deals with the entire span of history, with emphasis on Western civilization since 1800. The Modern European History test is limited in its content scope to post-1450 Europe and her relationships to the rest of the world. The Civics and Problems of Democracy tests are devoted to the important concepts, basic principles, and issues of each subject.

Results of Item Analysis

The items of the Civics subtest are particularly useful for the grade 9 and 10 level where a good deal of emphasis is placed on this topic.

There are also a few items relating to issues of World Concern such as the United Nations and the population explosion. The item content is heavily dependent upon American History. However, in many cases this can be easily converted to Canadian content by substituting the word "Canadian" for the word "American" since our political systems have many similarities.

Table 40 Cooperative Social Studies Tests

HISTORY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	AIMS FOR THE INTERMEDIATE DIVISION										
	1	2	3	4	5	6	7	8	9	10	11
Democracy											

NAME OF SUBTEST	GRADES 7 AND 8 OBJECTIVES						CORE CONTENT AREAS							
	1	2	3	4	5	6	1	2	3	4	5	6	7	8
Democracy					1/	/3								

NAME OF SUBTEST	GRADES 9 AND 10 OBJECTIVES					CORE CONTENT AREAS GOVERNMENT AND LAW											CONTEMPORARY ISSUES		
	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11	1	2	3
Democracy	6/2	10/2	13/5		/3														
Civics	28/5	23/5	6/																
World History			/3	1/															

NAME OF SUBTEST	CANADA'S MULTICULTURAL HERITAGE OBJECTIVES										
	1	2	3	4	5	6	7	8	9	10	
Democracy											(32 items are not related)
Civics											(22 items are not related)
World History	1/										(62 items are not related)

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Table 40A

Test Analysis: Specific Items Related to Objectives

Cooperative Social Studies Tests

Form A

Objective	Subtest	Item
	Problems of Democracy	
Grade 7 & 8 General		
5		8
6		(60), (61), (62)
Grade 9 & 10 General		
1		1, 25, 26, 27, 36, 65, (16), (29)
2		21, 22, 23, 24, 25, 37, 44, 44, 46, 47, (7), (64)
3		4, 5, 6, 9, 19, 20, 28, 38, 51, 52, 53, 54, 57, (2), (10-13)
5		(60), (61), (62)
Not related		3, 10, 11, 12, 13, 14, 15, 16, 17, 18, 30, 31, 32, 33, 34, 35, 39, 40, 41, 42, 43, 48, 49, 50, 55, 56, 58, 59, 60, 61, 62, 63
	Civics	
Grade 9 & 10 General		
1		7, 8, 9, 10, 11, 14, 15, 16, 24, 25, 26, 27, 32, 38, 41, 46, 47, 48, 49, 50, 51, 54, 60, 61, 62, 63, 64, 65, (39), (40), (55-59)
2		1, 6, 12, 13, 14, 15, 16, 23, 41, 42, 43, 44, 45, 48, 49, 50, 51, 60, 61, 62, 63, 64, 65, (7-11)
3		17, 18, 19, 20, 21, 53
Not related		2, 3, 4, 5, 22, 28, 29, 30, 31, 33, 34, 35, 36, 37, 39, 40, 52, 66, 67, 68, 69, 70

Objective	Subtest	Item
	World History	
Grade 9 & 10 General		
3		(28), (29), (30)
4		2
Multiculturalism General		
1		44
Multiculturalism Specific		
1		44, 60, 64, (67), (68)
Not related		1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 45, 46, 47, 48, 49, 50, 41, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66, 69, 70

IOWA TESTS OF EDUCATIONAL DEVELOPMENT--SRA ASSESSMENT SURVEY

Description

The Iowa Tests of Educational Development is the highest level of the SRA Assessment Survey, designed for use in secondary schools. The SRA Assessment Survey is a series of comprehensive achievement batteries for grades 1 through 12. It is designed to survey a student's general academic development; its focus is on the basic outcomes of education--the concepts and skills common to almost all school programs, regardless of their specific curricula.

The Iowa Tests of Educational Development (ITED) were developed by Lindquist and Feldt and the State University of Iowa and was one of the earliest widely used standardized achievement batteries. Two of the subtests of ITED which have items related to the area of History are Social Studies and Use of Sources. The Social Studies subtest deals with items related to Economics, Sociology, Government, U.S. History, World History, and Reading. The Use of Sources subtest deals with books, dictionary use, reference books, card catalogue, periodicals, reader's guide, government sources, and maps and globes.

Results of Item Analysis

In the Use of Sources subtest 43 items are directly related to testing library skills, general aim 10 and objective 6 for the grade 7 and 8 level. Only 3 of the 46 items are unrelated which is the most related subtest of any of those analysed. However, these items relate to only one skill--using the library, and this skill is also a part of other subject areas, particularly English and Geography.

The Social Studies subtest refers almost exclusively to facts of American History and would therefore not be useable for Canadian students in grades 7 to 10. Even the items that have some relationship fall into a marginal category as they are part of the optional areas in Canada and Contemporary World concerns where teachers are allowed to choose issues related to their own program.

Table 41 Iowa Tests of Educational Development

HISTORY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	AIMS FOR THE INTERMEDIATE DIVISION											
	1	2	3	4	5	6	7	8	9	10	11	
Social Studies												(24 items are not related)
Use of Sources										43/		(3 items are not related)

NAME OF SUBTEST	GRADES 7 AND 8 OBJECTIVES										CORE CONTENT AREAS							
	1	2	3	4	5	6					1	2	3	4	5	6	7	8
Social Studies																		
Use of Sources						43/												

NAME OF SUBTEST	GRADES 9 AND 10 OBJECTIVES							CORE CONTENT AREAS GOVERNMENT AND LAW														CONTEMPORARY ISSUES		
	1	2	3	4	5			1	2	3	4	5	6	7	8	9	10	11				1	2	3
Social Studies	1/2		2/2																					
Use of Sources					43/																			

NAME OF SUBTEST	CANADA'S MULTICULTURAL HERITAGE OBJECTIVES									
	1	2	3	4	5	6	7	8	9	10
Social Studies										
Use of Sources			43/							

Table 41A

Test Analysis: Specific Items Related to Objectives

IOWA Tests of Educational Development--SRA Assessment Survey

Form X 5

Objective	Subtest	Item
	Social Studies Background	
Grade 9 & 10 General		
1		(19), (34)
3		1, 14, (12), (28)
Not related		2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 29
	Use of Sources	
General Aims		
10		1, 2, 3, 4, 6-20, 22, 23, 24, 26-46
Grade 7 & 8 General		
6		1, 2, 3, 4, 6-20, 22, 23, 24, 26-46
Grade 9 & 10 General		
5		1, 2, 3, 4, 6-20, 22, 23, 24, 26-46
Multiculturalism General		
3		1, 2, 3, 4, 6-20, 22, 23, 24, 26-46
Not related		5, 21, 25

METROPOLITAN ACHIEVEMENT TESTS--ADVANCED BATTERY

Description

Metropolitan Achievement Tests are a series of measures designed to tell teachers and administrators how much pupils have learned in important content and skill areas of the school curriculum.

The test contents are based on analyses of contemporary textbooks, syllabuses, and other curricular sources.

The Social Studies subtest has 94 items divided between "content" and "skills"; 70 items measure pupils' knowledge of important concepts, names, terms used in social sciences; of facts, trends, generalizations in U.S. and world history and geography; 24 items measure pupils' skill in using maps and charts to get specific information and make generalizations.

Results of Item Analysis

The items of the Social Science subtest are heavily focussed on material familiar to American History students. However, there are a number of items that relate to the Civics section of the guideline. Items 83-86 are useful for assessing the development of interpretive skills such as drawing comparative information from two graphs. Most of the test items fall into the unrelated category.

Table 42 Metropolitan Achievement Tests

HISTORY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	AIMS FOR THE INTERMEDIATE DIVISION 1	2	3	4	5	6	7	8	9	10	11
Social Science	/1			/1				4/			

NAME OF SUBTEST	GRADES 7 AND 8 OBJECTIVES						CORE CONTENT AREAS							
	1	2	3	4	5	6	1	2	3	4	5	6	7	8

NAME OF SUBTEST	GRADES 9 AND 10 OBJECTIVES					CORE CONTENT AREAS GOVERNMENT AND LAW											CONTEMPORARY ISSUES		
	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11	1	2	3
Social Science	9/2	4/			4/														

NAME OF SUBTEST	CANADA'S MULTICULTURAL HERITAGE OBJECTIVES 1	2	3	4	5	6	7	8	9	10	
Social Science		3/1	4/					/1			(76 items are not related)

Table 42A

Test Analysis: Specific Items Related to Objectives

Metropolitan Achievement Tests--Advanced Battery

Objective	Subtest	Item
	Social Science	
General Aims		
1		(6)
4		(1)
8		83-86
Grade 9 & 10 General		
1		1, 6, 7, 12, 14, 51, 52, 60, 63, (10), (69)
2		1, 6, 7, 58
5		83-86
Multiculturalism General		
2		(54)
3		83-36
Multiculturalism Specific		
2		1, 6, 7
8		(9)
Not related		2, 3, 4, 5, 8, 11, 13, 15-50, 53, 55, 56, 57, 59, 61, 62, 64, 65, 66, 67, 68, 70-82, 87-94

SRA ASSESSMENT SURVEY--ACHIEVEMENT SERIES:FORM 3/RED LEVEL

Description

The SRA Assessment Survey is a series of comprehensive achievement batteries for grades 1 through 12. It is designed to survey a student's general academic development; its focus is on the basic outcomes of education--the concepts and skills common to almost all school programs, regardless of their specific curricula.

Six levels of the survey are available. The first five levels, Primary I, Primary II, Multilevel Blue, Multilevel Green, and Multilevel Red for the Achievement Series (ACH). These levels are designed for use in elementary schools. The highest level is the Iowa Tests of Educational Development (ITED), designed for use in secondary schools. Two forms are available for each level: forms E and F of ACH and forms X-5 and Y-5 of ITED.

The Red Level of the ACH Series is designed for grades 8 and 9. The Social Studies subtest contains items which deal with sociology, anthropology, geography, history, political science, pictures, graphs, and maps.

Results of Item Analysis

In the Use of Sources subtest 12 items are directly related and 16 items are indirectly related to the assessment of library skills, general aim 10, objective 6 for grades 7 and 8, and objective 5 for grades 9 and 10.

The Social Studies subtest has a strong emphasis on Geography rather than History and an equally strong emphasis on American rather than

Canadian content. A few items have a direct relationship to Contemporary World concerns and 6 items are indirectly related to Canadian-American relations.

Table 43 SRA Assessment Survey

HISTORY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	AIMS FOR THE INTERMEDIATE DIVISION 1	2	3	4	5	6	7	8	9	10	11
Social Studies								/6			
Use of Sources										12/16	

NAME OF SUBTEST	GRADES 7 AND 8 OBJECTIVES						CORE CONTENT AREAS							
	1	2	3	4	5	6	1	2	3	4	5	6	7	8
Use of Sources						12/16								

NAME OF SUBTEST	GRADES 9 AND 10 OBJECTIVES					CORE CONTENT AREAS GOVERNMENT AND LAW											CONTEMPORARY ISSUES		
	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11	1	2	3
Social Studies	5/		1/6																
Use of Sources					12/16														

NAME OF SUBTEST	CANADA'S MULTICULTURAL HERITAGE OBJECTIVES 1	2	3	4	5	6	7	8	9	10	
Social Studies											(23 items are not related)
Use of Sources			12/16								(12 items are not related)

Table 43A

Test Analysis: Specific Items Related to Objectives

SRA Assessment Survey--Achievement Series

Form E/Red Level

Objective	Subtest	Item
	Social Studies	
General Aims		
8		(15-20)
Grade 9 & 10 General		
1		4, 29-32
3		28, (9-14)
Not related		1-8, 21-27, 33-40
	Use of Sources	
General Aims		
10		1-8, 25-28, (17-24), (29-36)
Grade 7 & 8 General		
6		1-8, 25-28, (17-24), (29-36)
Grade 9 & 10 General		
5		1-8, 25-28, (17-24), (29-36)
Multiculturalism General		
3		1-8, 25-28, (17-24), (29-36)
Not related		9-16, 37-40

SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS (STEP)--SERIES II

Description

The Sequential Tests of Educational Progress (STEP) Series II is a battery of achievement tests designed to evaluate student progress toward fulfilling the broad, general goals of education in academic areas. In contrast to the limited focus of end-of-course achievement tests, STEP Series II concentrates on the measurement of those skills and understandings that should be part of the repertoire of every well-informed citizen. The battery includes tests in the following subject areas for grades 4 through 12: Reading, English Expression, Mathematics Basic Concepts, Science, and Social Studies. Tests in two additional areas, Mechanics of Writing and Mathematics Computation, are part of the battery for grades 4 through 12.

The Social Studies tests are designed to measure student development in the broad skills and understandings that every citizen should possess to be effective. The skills include the ability to read, organize, interpret, and evaluate information presented in tabular, pictorial, or prose form. The understandings include the nature of social change; the interdependence of individuals, communities, and societies; the way in which society directs and regulates the behaviour of its members; the nature of a democratic society; the effects of the geographical environment on man's way of life and of man's increasing control over the forces of nature; the ways in which man tries to understand and adjust to his environment; and man's economic needs and how they are satisfied. The content of stimulus materials and items is drawn from the areas of political science, sociology, anthropology, economics, history, and geography.

Results of Item Analysis

The items of the Social Studies subtest are quite useful in detecting skill development as outlined in Aim 8 "evaluating and interpreting evidence". The test items test a student's ability to read statements accurately, to interpret both print and pictures, and to read historical graphs. Much of the test falls into the unrelated category but fewer items are unrelated than in the other tests analysed in this study. The content of the items is all directed at American students and American History but can be easily adapted for Canadian students.

Table 44 Sequential Tests of Educational Progress (STEP) Series II

HISTORY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	AIMS FOR THE INTERMEDIATE DIVISION										
	1	2	3	4	5	6	7	8	9	10	11
Social Studies		2/			/1	2/		16/		2/	

NAME OF SUBTEST	GRADES 7 AND 8 OBJECTIVES						CORE CONTENT AREAS							
	1	2	3	4	5	6	1	2	3	4	5	6	7	8
Social Studies	2/		2/	4/	/1									

NAME OF SUBTEST	GRADES 9 AND 10 OBJECTIVES					CORE CONTENT AREAS GOVERNMENT AND LAW											CONTEMPORARY ISSUES		
	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11	1	2	3
Social Studies	/4	/4	1/4		14/														

NAME OF SUBTEST	CANADA'S MULTICULTURAL HERITAGE OBJECTIVES										
	1	2	3	4	5	6	7	8	9	10	
Social Studies			14/								(28 items are not related)

Table 44A

Test Analysis: Specific Items Related to Objectives

Sequential Tests of Educational Progress (STEP)--Series II

Objectives	Subtest	Item
	Social Studies	
General Aims		
2		4, 5
5		(23)
6		2, 3
8		27-35, 44-50
10		2, 3
Grade 7 & 8 General		
1		4, 5
3		2, 3
4		2, 3, 4, 5
5		(1)
Grade 9 & 10 General		
1		(27-30)
2		(27-30)
3		1, (47-50)
5		27-33, 44-50
Multiculturalism General		
3		27-33, 44-50
Not related		6-22, 24, 25, 26, 36-43

STANFORD ACHIEVEMENT TEST--ADVANCED BATTERY

Description

The Stanford Achievement Test is a series of comprehensive achievement tests developed to provide measurement and assessment of learning at different levels of the educational process.

Advanced Level Complete is primarily designed for use from the beginning of grade 7 to the middle of grade 9.

One subtest in the Advanced battery, Social Science, is related to the area of History.

The Social Science test measures the pupil's ability to understand key concepts in six social science disciplines, i.e., Geography, History, Economics, Political Science, Anthropology, and Sociology. The ability to infer, to reason, to predict, and to conclude is measured in different ways through the reading of various global projections, interrelated maps, demographic data, political posters, and organizational charts. Inference skills are measured through questions which call for the display of problem-solving skills.

Results of Item Analysis

In the Social Science subtest the American content of most of the items make them unrelated to the Ontario guidelines in History. Six items, 37 to 42, are useful for assessing student understanding of municipal government. Also, three items are related to objective 1 at the grade 9 and 10 level.

Table 45 Stanford Achievement Test

HISTORY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	AIMS FOR THE INTERMEDIATE DIVISION										
	1	2	3	4	5	6	7	8	9	10	11
Social Science				1/							

NAME OF SUBTEST	GRADES 7 AND 8 OBJECTIVES										CORE CONTENT AREAS							
	1	2	3	4	5	6					1	2	3	4	5	6	7	8

NAME OF SUBTEST	GRADES 9 AND 10 OBJECTIVES							CORE CONTENT AREAS GOVERNMENT AND LAW														CONTEMPORARY ISSUES		
	1	2	3	4	5			1	2	3	4	5	6	7	8	9	10	11				1	2	3
Social Science	3/	7/																						

NAME OF SUBTEST	CANADA'S MULTICULTURAL HERITAGE OBJECTIVES										
	1	2	3	4	5	6	7	8	9	10	
Social Science		/2	/2		/2			/2		/2	(51 items are not related)

Table 45A

Test Analysis: Specific Items Related to Objectives

Stanford Achievement Test--Advanced Battery

Objective	Subtest	Item
	Social Science	
General Aims		
4		16
Grade 9 & 10 General		
1		16, 20, 28
2		16, 37-42
Multiculturalism General		
2		(25), (26)
Multiculturalism Specific		
3		(25), (26)
5		(25), (26)
8		(25), (26)
10		(25), (26)
Not related		1-24, 27, 29-36, 43-60

TESTS OF ACADEMIC PROGRESS--FORM S

Description

The Tests of Academic Progress, Form S, were designed to provide a comprehensive appraisal of student progress towards widely accepted academic goals of secondary school education. The battery comprises six tests: Social Studies, Composition, Science, Reading, Mathematics, and Literature.

Each test in the battery was designed to measure the extent to which the objectives of a basic area of high school instruction have been achieved.

The Social Studies subtest contains 60 four-option multiple-choice items at each grade level. The items were selected to reflect the most current content and objectives of the social studies curriculum at each grade. The test includes items on American history, world history, government, geography, economics, sociology, and study skills. Some items test knowledge of fact; many test ability to use factual knowledge of social studies in unfamiliar situations.

Results of Item Analysis

In the Social Studies subtest most items, 89, are not related to any objective at the Intermediate level. This is primarily because of the strong focus on American History. Nine items offer some use in the assessment of interpretation of graphs but this is only related indirectly.

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Table 46 Tests of Academic Progress Form S

HISTORY OBJECTIVES

Code: direct / indirect

AIMS FOR THE INTERMEDIATE DIVISION

NAME OF SUBTEST	1	2	3	4	5	6	7	8	9	10	11
Social Studies							1/	/10			

NAME OF SUBTEST	GRADES 7 AND 8 OBJECTIVES						CORE CONTENT AREAS							
	1	2	3	4	5	6	1	2	3	4	5	6	7	8

NAME OF SUBTEST	GRADES 9 AND 10 OBJECTIVES					CORE CONTENT AREAS GOVERNMENT AND LAW											CONTEMPORARY ISSUES		
	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11	1	2	3
Social Studies	6/1		/1																

CANADA'S MULTICULTURAL HERITAGE OBJECTIVES

NAME OF SUBTEST	1	2	3	4	5	6	7	8	9	10	
											(89 items are not related)
Social Studies	1/	1/								1/	

Table 46A

Test Analysis: Specific Items Related to Objectives

Tests of Academic Progress--Form S

Objective	Subtest	Item
	Social Studies	
General Aims		
7		59
8		(92-100), (120)
Grade 9 & 10 General		
1		16, 42, 43, 51, 88, 90, (108)
3		(57)
Multiculturalism General		
1		41
Multiculturalism Specific		
1		41
2		41
10		41
Not related		1-15, 17-40, 44-50, 52-56, 58, 60-87, 89, 91, 101-106, 109-119

SUMMARY OF ITEM ANALYSIS

Very few items in the 8 subtests analysed in this study relate to any of the objectives in the Intermediate History guideline. This is primarily because the content of most of the Social Studies test items assess a student's knowledge of American History while many of the items relate to knowledge and skills in Geography rather than History. The great majority of test items are therefore categorized as unrelated.

The objectives that are related most frequently to test items are those that deal with a student's knowledge and skills in the use of library and resource materials and this is a skill that is only peripheral to a knowledge of History. This skill is also a part of other curriculum areas, such as English and Geography. A few test items related to a student's skill in "evaluating and interpreting evidence, drawing conclusions based on evidence, synthesizing, and making judgments". This objective applies to all levels of the Intermediate division.

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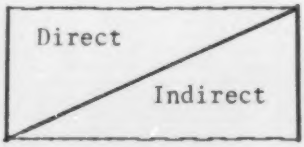
Results: Item Analysis for Geography

PROCEDURE FOR ITEM ANALYSIS

The items of each standardized test were examined to determine the knowledge and skills a child would need to know in order to respond correctly to each item. The Geography specialists, who did the analysis and who had helped develop the new guidelines, then asked "Which objectives in the new Geography guideline would enhance the child's ability to answer the item correctly?"

Within those objectives related to a particular test item, some have far greater significance than others. However, this analysis does not attempt to give a rank ordering of the significance of related objectives. Instead, the analysis uses a bi-polar distinction between those objectives *directly* related to a test item and those objectives *indirectly* related to the same test item. The total number of items directly related to an objective are entered on the top of the diagonal and the number on the bottom of the diagonal indicates the total number of indirect items related to an objective. This format is illustrated below.



The results of the item analysis for each standardized test are tabulated in two forms. The first form is a summary chart which displays visually the general areas being measured by the test items. In the summary chart the total number of items both directly and indirectly related to the objectives are listed using the format described above.

The second form is a table which identifies by the actual number of the test item, the specific items related to each objective. In these tables, the items which are indirectly related to an objective are enclosed in brackets ( ).

GEOGRAPHY OBJECTIVES IN THE INTERMEDIATE DIVISION

The objectives in Geography describe the core content to be taught and the skills to be developed. The test items in Geography have been analysed in relation to the skills a student would need to answer the item correctly. Each grade in the Intermediate Division deals with a particular geographic area; North America in grade 7, the Southern Continents in grade 8, Canada in grade 9, and Europe and Asia in grade 10. The objectives for Skill development in each of these grades are listed below.

1 North America

1.1 using latitude and longitude, map grids, compass points, and degrees to determine location and direction;
1.2 using atlas gazetteers to locate places;
1.3 locating places using distance and direction from other points;
1.4 using linear and verbal scales to measure distance on maps;
1.5 deriving information from atlas maps of relief, climate, mineral production, transportation, population, and political divisions;
1.6 using conventional symbols and colours to convey information and indicate boundaries;
1.7 drawing cross-sections or profiles using atlas maps or simple contour maps;
1.8 transferring information from a map to a cross-section to show relationships;
1.9 presenting and deriving information from various sources such as statistics, graphs, charts, photographs, and diagrams;
1.10 sketching simple maps to show dominant features such as landforms, transportation routes, or city locations;
1.11 using flow diagrams to present and derive information;
1.12 obtaining information from a variety of photo types including vertical and oblique aerial photographs

2 The Southern Continents

2.1 using latitude and longitude, map grids, compass points, and degrees to determine location and direction;

2.2 using distance and direction from some places to locate other places;

2.3 using linear and verbal scales to measure distance;

2.4 selecting and deriving information from atlas maps of climate, vegetation, agriculture, resources, land use, and population;

2.5 using conventional map symbols and colours to show quantities and distribution;

2.6 using line, bar, and circle graphs to derive and present statistical information, including climatic data;

2.7 using flow charts and diagrams to present and derive information

2.8 deriving information from a variety of photographs including vertical and oblique aerial photographs;

2.9 drawing simple sketch maps or diagrams from photographs or maps;

2.10 combining information from two or more maps to show relationships.

3 Canada

3.1 using topographic maps and/or air photographs for the purpose of
- determining direction
- determining elevation from contours and spot heights
- becoming familiar with conventional symbols and the use of colour
- locating precisely using co-ordinates
- recognizing degrees of relief, for example flat, rolling, hilly, or rugged terrain
- identifying common features by shapes
- drawing profiles or transects
- orienting air photographs to maps
- correlating information from photo and map or from map to transect;

3.2 interpreting relationships among relief and land use;

3.3 interpreting thematic maps;

3.4 correlating two or more maps using map overlays;

3.5 using sketch maps, profiles, and transects to interpret photographs and maps;

3.6 constructing and interpreting charts and graphs, including percentage bar graphs, double-bar graphs, and multiple-line graphs;

3.7 making simple calculations of percentages, averages, and densities to make comparisons or establish relationships;

3.8 using flow charts and diagrams to illustrate the movement of commodities or the stages in various processes.

4 Europe and Asia

4.1 using maps based on a variety of scales and projections to determine direction, distance, and location;

4.2 use of degrees and minutes for precision in determining location on the earth's surface;

4.3 drawing and interpreting cross-sections and transects;

4.4 recognizing patterns on maps through understanding of the use of lines, colours, and symbols in cartographic representation;

4.5 interpreting a variety of thematic maps such as those showing physical, cultural, economic, or political data;

4.6 correlating information from two or more thematic maps;

4.7 sketching simple maps or diagrams to show distributions or relationships;

4.8 using flow charts and diagrams to show movement of commodities or stages in a process;

4.9 comparing statistics in different forms;

4.10 making simple calculations to determine percentages, averages, densities, or yields;

4.11 constructing and interpreting charts and graphs including percentage bar graphs, double-bar graphs, and multiple-line graphs.

TESTS IN GEOGRAPHY

The 8 tests with Geography items analysed in this study are listed below.

Canadian Tests of Basic Skills
Cooperative Social Studies Tests
Iowa Tests of Educational Development
Metropolitan Achievement Tests
SRA Assessment Survey
Sequential Tests of Educational Progress
Stanford Achievement Test
Tests of Academic Progress

CANADIAN TESTS OF BASIC SKILLS

Description

The Canadian Tests of Basic Skills measure achievement in a number of subjects in the Intermediate Division. In this study the tests of Work Skills in Map Reading and Reading Graphs and Tables were analysed. As the name suggests, the tests emphasize skills rather than content.

Norms for the grade levels applicable to the division are provided in the manual, along with instructions on administering the tests and interpreting the scores.

Results of Item Analysis

The Canadian Tests of Basic Skills has two subtests with items related to the Geography guidelines--Map Reading and Using Graphs and Tables. The Map Reading subtest covers the majority of objectives at all four grade levels. The largest number of items, 89, is related to using conventional map symbols and colours (7.6 and 8.5). Interpreting thematic maps is measured by 70 items at the grade 9 level and by 65 items at the grade 10 level. Using latitude and longitude is measured by 24 items at the grade 7 level, by 32 items at the grade 8 level, and by 46 items at the grade 10 level.

The Graphs and Tables subtest has 66 items which are directly related to deriving information from various sources (7.9). This same objective is measured by 21 items at the grade 8 level (8.6) by 37 items at the grade 9 level (9.6) and by 37 items at the grade 10 level (10.11). Five items are related to using flow diagrams (7.11), making comparisons from percentages (9.7), using flow charts (10.8), comparing statistics (10.9), and making simple calculations (10.10).

Table 47 Canadian Tests of Basic Skills

GEOGRAPHY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	GRADE 7 — NORTH AMERICA 1	2	3	4	5	6	7	8	9	10	11	12	GRADE 8 — SOUTHERN CONTINENTS 1	2	3	4	5	6	7	8	9	10
Map Reading	24/		36/	17/	52/	89/		2/	31/				32/	26/	17/	40/	84/		1/		1/	21/
Graphs & Tables									66/		5/							21/	8/			

NAME OF SUBTEST	GRADE 9 — CANADA 1	2	3	4	5	6	7	8	GRADE 10 — EUROPE AND ASIA 1	2	3	4	5	6	7	8	9	10	11	
Map Reading		18/	70/	30/	3/		12/		46/	11/	2/	59/	65/	21/			10/	12/		
Graphs & Tables						37/	5/									5/	5/	5/	37/	(32 items are not related)

Table 47A

Test Analysis: Specific Items Related to Objectives

Canadian Tests of Basic Skills

Objective	Subtest	Item
	Map Reading	
1.1		1,2,3,4,5,6,7,8,9,10,11,48,49,50,51, 56,57,58,59,85,86,87,88,89
1.3		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15, 16,17,18,19,26,27,34,38,43,45,46,47, 48,49,51,58,60, 81,82,83,84
1.4		6,11,15,19,26,27,34,38,43,45,47, 60,65,81,82,83,84
1.5		20,21,22,23,24,25,26,27,28,29,30,31, 32,33,34,35,36,37,38,39,40,41,42,43, 44,45,46,47,49,53,55,57,61,63,64,65, 66,67,69,70,71,72,74,75,76,77,78,79, 80,81,83,84
1.6		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15, 16,17,18,19,20,21,22,23,24,25,26,27, 28,29,30,31,32,33,34,35,36,37,38,39, 40,41,42,43,44,45,46,47,48,49,50,51, 52,53,54,55,56,57,58,59,60,61,62,63, 64,65,66,67,68,69,70,71,72,73,74,75, 76,77,78,79,80,81,82,83,84,85,86,87, 88,89
1.8		22,76
1.9		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15, 16,17,18,19,22,30,36,39,45,47,67,68, 76,77,78,80
2.1		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15, 16,17,18,19,48,49,50,51,56,57,58,59, 85,86,87,88,89
2.2		1,2,3,4,5,6,11,15,17.19,25,26,27,34, 38,45,47,48,49,51,58,60,81,82,83,84
2.3		6,11,15,19,25,26,27,34,38,45,47,60, 65,81,82,83,84
2.4		28,29,30,31,32,33,34,35,36,37,38,39, 40,41,42,43,44,45,46,47,48,49,52,53, 55,61,62,63,64,66,67,68,69,70,71,72, 73,77,78,80
2.5		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15, 16,17,18,19,20,21,22,23,24,25,26,27, 28,29,30,31,32,33,34,35,36,37,38,39, 40,41,42,43,44,45,46,47,48,50,51,56, 57,58,59,60,61,62,63,64,65,66,67,68, 69,70,71,72,73,74,75,76,77,78,79,80, 81,82,83,84,85,86,87,88,89

Objective	Subtest	Item
	Map Reading	
2.7		22
2.9		30
2.10		28,29,30,31,32,33,34,35,36,37,61,63,65,66,70,71,72,73,75,76,77
3.2		21,22,23,25,28,29,30,31,32,33,34,35,36,37,52,61,70,76
3.3		20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89
3.4		28,29,30,31,32,33,34,35,36,37,59,60,61,62,63,64,65,66,67,68,69,70 71,72,73,74,75,76,77,78
3.5		22,30,76
3.7		39,45,47,58,67,68,71,77,78,80,82,84
4.1		20,21,22,23,24,25,25,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,50,51,56,57,58,59,60,65,81,82,83,84,85,86,87,88,89
4.2		48,50,51,54,56,58,85,86,87,88,89
4.3		22,76
4.4		20,21,22,23,24,25,25,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78
4.5		20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84
4.6		28,29,30,31,32,33,34,35,36,37,61,63,65,66,70,71,72,73,75,76,77
4.9		36,39,45,57,67,68,71,77,78,80
4.10		39,45,47,58,67,68,71,77,78,80,82,84

Objective	Subtest	Item
	Reading Graphs & Tables	
1.9		9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74
1.11		33,34,35,36,37
2.6		9,10,11,12,13,14,15,21,22,23,25,29,30,31,32,41,42,43,44,45,46
2.7		33,34,35,36,37,38,39,40
3.6		33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,61,62,63,64,65,66,67,68,69,70,71,72,73,74
3.7		56,57,58,59,60
4.8		33,34,35,36,37
4.9		56,57,48,49,60
4.10		56,57,58,59,60
4.11		33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,61,62,63,64,65,66,67,68,69,70,71,72,73,74
Not related		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32

THE COOPERATIVE SOCIAL STUDIES TESTS

Description

These tests measure achievement in seven major areas of the Intermediate Social Studies curriculum. In this study the American History and Civics subtests were analysed. The time required for each subtest is 40 minutes.

Norms for the grade levels applicable to the tests are included in the manual, as well as instructions for administering and scoring the tests.

Results of Item Analysis

The Civics subtest has 6 items directly related to deriving information from atlas maps (7.5 and 8.4). Nineteen items are related to deriving information from various sources such as statistics, graphs, charts, photographs, and diagrams (7.9). Five items are related to interpreting thematic maps at both the grade 9 (9.3) and the grade 10 level (10.5). Using flow charts (8.5, 9.8, and 10.8) is measured by 5 items.

The American History subtest does have items related to the Ontario Geography guidelines. Twelve items are directly related to using latitude and longitude in grade 7 (7.1) and grade 8 (8.1). Deriving information from graphs (7.5 and 8.4) is directly measured by 14 items. Thirteen items are directly related to deriving information from various sources (7.9). This subtest does not measure any objectives of the grade 9 program.

Table 48 The Cooperative Social Studies Tests

GEOGRAPHY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	GRADE 7 — NORTH AMERICA												GRADE 8 — SOUTHERN CONTINENTS									
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
Civics					6/				19/		5/					6/		2/	5/			
American History	12/				14/				13/				12/			14/						

NAME OF SUBTEST	GRADE 9 — CANADA								GRADE 10 — EUROPE AND ASIA											
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	
Civics			5/			2/		5/					5/			5/			2/	(58 items are not related)
American History												12/								(58 items are not related)

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Table 48A

Test Analysis: Specific Items Related to Objectives

The Cooperative Social Studies Tests

Objective	Subtest	Item
	Civics	
1.5		17, 18, 19, 20, 21, 29
1.9		14, 15, 16, 33, 34, 39, 40, 48, 49, 50, 51, 50, 51, 62, 63, 64, 65, 66, 67
1.11		55, 56, 57, 58, 59
2.4		17, 18, 19, 29, 21, 29
2.6		39, 40
2.7		55, 56, 57, 58, 59
3.3		17, 18, 19, 20, 21
3.6		39, 40
3.8		55, 56, 57, 58, 59
4.5		17, 18, 19, 20, 21
4.8		55, 56, 57, 58, 59
4.11		39, 40
Not related		1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, 47, 48, 49 50, 51, 52, 53, 54, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70
	American History	
1.1		6, 7, 8, 9, 10, 11, 12, 40, 41, 42, 43, 44
1.5		6, 7, 8, 9, 10, 11, 12, 40, 41, 42, 43, 44, 62, 67
1.9		19, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37
2.1		6, 7, 8, 9, 10, 11, 12, 40, 41, 42, 43, 44
2.4		6, 7, 8, 9, 10, 11, 12, 40, 41, 42, 43, 44, 62, 67
4.4		6, 7, 8, 9, 10, 11, 12, 40, 41, 42, 43, 44
Not related		1, 2, 3, 4, 5, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70

IOWA TESTS OF EDUCATIONAL DEVELOPMENT

Description

The Iowa Test of Educational Development is intended to provide measures of educational development that are appropriate for all high school students, regardless of the specific curriculum they are following. This means that test content has been dictated more by the general needs of the high school student than by the specific material presented in various advanced courses. The ITED test, therefore, is not intended to cover highly specific, advanced content.

In this study the Social Studies test was analysed for the Intermediate Division. The test is made up of two parts: the questions based on the two social studies passages in the Reading Comprehension subtest and the Social Studies Background test. The Social Studies test has 30 items and a working time of 20 minutes.

Norms for the grade levels applicable to this test are included in the manual, along with a schedule for administering the test and notes on interpreting the scores and remedial instruction.

Results of Item Analysis

In the Social Studies subtest there are 8 items which relate directly to deriving information from atlas maps at the grade 7 level (7.5) and 10 items related to the same objective at the grade 8 level (8.4). None of the items are related to the grade 9 level. In grade 10, eleven objectives are related to interpreting charts and graphs.

Table 49 Iowa Tests of Educational Development

GEOGRAPHY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	GRADE 7 — NORTH AMERICA																GRADE 8 — SOUTHERN CONTINENTS																	
	1	2	3	4	5	6	7	8	9	10	11	12					1	2	3	4	5	6	7	8	9	10								
Social Studies					8/				1/											10/														

NAME OF SUBTEST	GRADE 9 — CANADA											GRADE 10 — EUROPE AND ASIA																						
	1	2	3	4	5	6	7	8				1	2	3	4	5	6	7	8	9	10	11												
Social Studies																11/							(19 items are not related)											

Table 49A

Test Analysis: Specific Items Related to Objectives

Iowa Tests of Educational Development

Objective	Subtest	Item
	Social Studies	
1.5		3, 4, 5, 14, 16, 18, 21, 30
1.9		6
2.4		3, 4, 5, 6, 12, 14, 16, 21, 24, 30
4.5		3, 4, 5, 6, 12, 14, 16, 18, 21, 24, 30
Not related		1, 2, 7, 8, 9, 10, 11, 13, 15, 17, 19, 20, 22, 23, 25, 26, 27, 28, 29

THE METROPOLITAN ACHIEVEMENT TESTS

Description

The Metropolitan Achievement Tests are a series of measures designed to tell teachers and administrators how much pupils have learned in important content and skills areas of the school curriculum.

In this study, the Advanced Level test in Social Studies was analysed. The time required for this subtest of 94 items is 45 minutes. Instructions for the administration of the test are included in the manual.

Norms for the grade levels applicable to the Advanced Level test are included in the manual, as well as some notes on interpreting the scores and planning follow-up work.

Results of Item Analysis

The Social Studies subtest has 13 items directly related to deriving information from atlas maps at the grade 7 level (7.5) and 15 items related to the same objective at the grade 8 level (8.4). Twelve items are related to using conventional symbols and colours (7.6 and 8.5) and the same number of items is also related to deriving information from various sources (7.9 and 8.6). Three items relate to the objective in both grades 7 and 8 of using latitude and longitude.

In grades 9 and 10 the objective of using thematic maps (9.3 and 10.5) is measured by 12 items at the grade 9 level and 21 items at the grade 10 level. Twelve items are related to interpreting charts and graphs (9.6 and 10.11). At the grade 10 level 14 items are related to comparing statistics in different forms. Eighteen of the objectives in grades 7 to 10 are not measured by any test items.

Table 50 The Metropolitan Achievement Tests

GEOGRAPHY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	GRADE 7 — NORTH AMERICA												GRADE 8 — SOUTHERN CONTINENTS									
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
Social Studies	3/		5/	1/	13/	12/			12/				3/	5/	1/	15/	12/	12/				

NAME OF SUBTEST	GRADE 9 — CANADA								GRADE 10 — EUROPE AND ASIA											
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	
Social Studies		1/	12/			12/	2/		4/	1/		12/	21/				14/	1/	12/	(60 items are not related)

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Table 50A

Test Analysis: Specific Items Related to Objectives

The Metropolitan Achievement Tests

Objective	Subtest	Item
	Social Studies	
1.1		71,78,82
1.3		71,72,73,80,82
1.4		76
1.5		43,44,46,47,50,59,68,72,74,75,77,79,81
1.6		71,72,73,74,75,76,77,78,79,80,81,82
1.9		83,84,85,86,87,88,89,90,91,92,93,94
2.1		71,78,82
2.2		71,72,73,80,82
2.3		76
2.4		43,44,46,47,50,54,59,64,68,72,74, 75,77,79,81
2.5		71,72,73,74,75,76,77,78,79,80,81,82
2.6		83,84,85,86,87,88,89,90,91,92,93,94
3.2		81
3.3		71,72,73,74,75,76,77,78,79,80,81,82
3.6		83,84,85,86,87,88,89,90,91,92,93,94
3.7		69,74
4.1		71,76,78,82
4.2		78
4.4		71,72,73,74,75,76,77,78,79,80,81,82
4.5		43,44,46,47,50,54,59,64,68,71,72,73, 74,75,76,77,78,79,80,81,82
4.9		69,74,83,84,85,86,87,88,89,90,91, 92,93,94
4.10		74
4.11		83,84,85,86,87,88,89,90,91,92,93,94
Not related		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15, 16,17,18,19,20,21,22,23,24,25,26,27, 28,29,30,31,32,33,34,35,36,37,38,39, 40,41,42,45,48,51,52,53,55,56,57,58, 60,61,62,63,65,66,67,69,70

THE SRA ACHIEVEMENT SERIES

Description

The tests in the SRA (Science Research Associates) Achievement Series were designed to test a student's general academic development. Tests focus on the basic outcomes of education--the concepts and skills that are found in most school programs, regardless of each school's specific curriculum.

In this study, the Social Studies test was analysed for the Intermediate Division. The test had an illustration, a pie graph, and a map for the student to study. Forty items were presented over 30 minutes of testing time.

The manual includes norms for the grade levels in the division, a recommended schedule for administering the test, and notes on interpreting the scores and remedial instruction.

Results of Item Analysis

The Social Studies subtest has 14 items which are related directly to deriving information from atlas maps (7.5 and 8.4). Ten items are related to "presenting and deriving information from various sources such as statistics, graphs, charts, photographs, and diagrams" (7.10). In grade 8 the same ten items are related to 8.6 using graphs and 8.7 using flow charts to derive information. In grades 9 and 10, 6 items are related to interpreting charts and graphs (9.6 and 10.11) and 6 items are related to making simple calculations (9.7 and 10.10).

There were no items in this subtest which related to drawing maps or interpreting thematic maps.

Table 51 The SRA Achievement Series

GEOGRAPHY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	GRADE 7 — NORTH AMERICA												GRADE 8 — SOUTHERN CONTINENTS									
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
Social Studies	1/				14/				10/				1/			14/		6/	4/			

NAME OF SUBTEST	GRADE 9 — CANADA								GRADE 10 — EUROPE AND ASIA											
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	
Social Studies						6/	6/											6/	6/	(34 items are not related)

Table 51A

Test Analysis: Specific Items Related to Objectives

The SRA Achievement Series

Objective	Subtest	Item
	Social Studies	
1.1		39
1.5		3, 5, 8, 22, 24, 28, 33, 34, 35, 36, 37, 38, 39, 40
1.9		15, 16, 17, 18, 19, 20, 29, 30, 31, 32
2.1		39
2.4		3, 5, 8, 22, 24, 28, 33, 34, 35, 36, 37, 38, 39, 40
2.6		15, 16, 17, 18, 19, 20
2.7		29, 30, 31, 32
3.6		15, 16, 17, 18, 19, 20
3.7		15, 16, 17, 18, 19, 20
4.10		15, 16, 17, 18, 19, 20
4.11		15, 16, 17, 18, 19, 20
Not related		1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

SEQUENTIAL TESTS OF EDUCATIONAL PROGRESS (STEP)

Description

The STEP Series II is a battery of achievement tests designed to evaluate student progress towards fulfilling the broad, general goals of education in academic areas.

In this study, the Social Studies test for the Intermediate Division was analysed. The Social Studies tests are designed to measure student development in the broad skills and understanding that every citizen should possess to be effective. The test requires 45 minutes of working time and contains 50 questions.

Norms for the grade levels applicable to the test are included in the manual, along with the usual details for administering and interpreting the tests.

Results of Item Analysis

The Social Studies subtest covers a wider range of objectives than any other test analysed in this study. There is a reasonable distribution of items related to almost all objectives at the grades 8, 9, and 10 levels. Twenty-eight items are related to deriving information from various sources at the grade 7 level (7.9). Eleven items relate directly to "using conventional symbols and colours to convey information" at the grade 7 level (7.6) and the grade 8 level (8.5). Interpreting thematic maps is measured by 8 items at both the grade 9 level (9.3) and the grade 10 level (10.5). At the grade 10 level, 10 items are related to comparing statistics in different forms (10.9) and 9 items are related to interpreting graphs and charts (10.11). There are no items related to the use of degrees and minutes for precision (10.2).

Table 52 Sequential Tests of Educational Progress (STEP)

GEOGRAPHY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	GRADE 7 — NORTH AMERICA																GRADE 8 — SOUTHERN CONTINENTS																	
	1	2	3	4	5	6	7	8	9	10	11	12					1	2	3	4	5	6	7	8	9	10								
Social Studies			4/		9/	11/			28/			2/						4/		5/	11/	6/	7/	2/		4/								

NAME OF SUBTEST	GRADE 9 — CANADA											GRADE 10 — EUROPE AND ASIA																						
	1	2	3	4	5	6	7	8				1	2	3	4	5	6	7	8	9	10	11												
Social Studies	2/	3/	8/		3/	9/	2/	3/				3/		3/	4/	8/	4/	3/	3/	10/	2/	9/	(24 items are not related)											

Table 52A

Test Analysis: Specific Items Related to Objectives

Sequential Tests of Educational Progress (STEP)

Objective	Subtest	Item
	Social Studies	
1.3		34, 48, 49, 50
1.5		4, 5, 6, 7, 34, 47, 48, 49, 50
1.6		4, 5, 6, 7, 24, 25, 26, 47, 48, 49, 50
1.9		2, 3, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 24, 25, 26, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46
1.12		2, 3
2.2		34, 48, 49, 50
2.4		34, 47, 48, 49, 50
2.5		4, 5, 6, 7, 27, 25, 26, 47, 48, 49, 50
2.6		14, 15, 16, 44, 45, 46
2.7		13, 21, 22, 24, 25, 26, 35
2.8		2, 3
2.10		4, 5, 6, 7
3.1		2, 3
3.2		24, 25, 26
3.3		4, 5, 6, 7, 47, 48, 49, 50
3.5		24, 25, 26
3.6		14, 15, 16, 36, 37, 38, 44, 45, 46
3.7		15, 34
3.8		21, 22, 34
4.1		48, 49, 50
4.3		22, 25, 26
4.4		47, 48, 49, 50
4.5		4, 5, 6, 7, 47, 48,49, 50
4.6		4, 5, 6, 7
4.7		21, 22, 35
4.8		21, 22, 34
4.9		14, 15, 16, 34, 36, 37, 38, 44, 45, 46
4.10		15, 34
4.11		14, 15, 16, 36, 37, 38, 44, 45, 46
Not related		1, 8, 9, 10, 11, 12, 13, 17, 18, 19, 20, 23, 27, 28, 29, 30, 31, 32, 33, 39, 40, 41, 42, 43

STANFORD ACHIEVEMENT TEST

Description

This test is a series of comprehensive achievement tests developed to provide measurement and assessment of learning at different levels of the educational process. The tests have been planned with a view towards simplicity of administration, scoring, and interpretation so that they may be used effectively by persons with little or no formal training in the use of standardized tests.

In this study the Advanced Level Social Science test--primarily designed for use from the beginning of grade 7 to the middle of grade 9--was analysed. The test measures the pupils' ability to understand key concepts in a number of social science disciplines. The test consists of 60 items.

Norms for the grade levels applicable to the Advanced Level battery are included in the manual, along with time limits, a schedule for administering the test, and notes on interpreting the scores and remedial instruction.

Results of Item Analysis

The Social Science subtest has 12 items related to deriving information from atlas maps (7.5 and 8.4) and 12 items related to using conventional symbols and colours (7.6 and 8.5). Eight items relate directly to using latitude and longitude (7.1 and 8.1) with 3 items measuring the use of distance and direction (7.3 and 8.2). Twelve items at the grade 8 level are related to combining information to show relationships (8.10).

Eleven items are related to the use of thematic maps (9.3 and 10.5). The use of flow charts (9.8 and 10.8) is measured by 6 items. At the grade 10 level 8 items are related to using maps to determine direction (10.1), 4 items are related to the use of degrees and minutes (10.2), and 13 items measure the recognition of patterns on maps through the use of lines, colours, and symbols in cartographic representation. A total of 19 objectives in the four grade levels are not measured by any test items.

Table 53 Stanford Achievement Test

GEOGRAPHY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	GRADE 7 — NORTH AMERICA																GRADE 8 — SOUTHERN CONTINENTS																	
	1	2	3	4	5	6	7	8	9	10	11	12					1	2	3	4	5	6	7	8	9	10								
Social Science	8/		3/		12/	12/			8/								8/	3/		12/	12/					12/								

NAME OF SUBTEST	GRADE 9 — CANADA											GRADE 10 — EUROPE AND ASIA																						
	1	2	3	4	5	6	7	8				1	2	3	4	5	6	7	8	9	10	11												
Social Science		5/	11/				1/	6/				8/	4/		13/	11/	11/		6/	1/	1/		(32 items are not related)											

Table 53A

Test Analysis: Specific Items Related to Objectives

Stanford Achievement Test

Objective	Subtest	Item
	Social Science	
1.1		7, 43, 44, 45, 46, 47, 48, 49
1.3		77, 43, 47
1.5		15, 50, 51, 52, 53, 54, 55, 56, 57, 48, 49, 60
1.6		49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
1.9		14, 24, 37, 38, 39, 40, 41, 42
2.1		7, 43, 44, 45, 46, 47, 48, 49
2.2		7, 43, 47
2.4		15, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
2.5		49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
2.10		50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
3.2		6, 15, 24, 59, 60
3.3		50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
3.7		14
3.8		37, 38, 39, 40, 41, 42
4.1		7, 43, 44, 45, 46, 47, 48, 49
4.2		7, 45, 46, 48
4.4		15, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
4.5		50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
4.6		50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
4.8		37, 38, 39, 40, 41, 42
4.9		14
4.10		14
Not related		1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36

TESTS OF ACADEMIC PROGRESS

Description

The Tests of Academic Progress were designed to provide an efficient and comprehensive appraisal of student progress towards widely accepted academic goals of secondary-school education. The battery consists of six tests. Each test was designed to measure the extent to which the objectives of a basic area of high school instruction have been achieved.

In this study the Social Studies test for the Intermediate Division was analysed. Forty items testing knowledge of fact and ability to use factual knowledge of social studies in unfamiliar situations were surveyed.

Norms for the grade levels applicable to the division are included in the manual along with times for the tests, a recommended schedule for administering the tests, as well as notes on interpreting the scores and remedial instruction.

Results of Item Analysis

The Social Studies subtest has 13 items which are directly related to maps skills in all 4 grade levels 7, 8, 9, and 10. These items measure the skill of "presenting and deriving information from various sources such as statistics, graphs, charts, photographs, and diagrams". Seven items relate to all grade levels in the skill of "using conventional symbols and colours to convey information and indicate boundaries". Other skills measured by a few items are using latitude and longitude

(3 items) using atlas maps (5 items), using topographic maps (4 items), correlating maps (4 items), and comparing statistics (6 items).

The test items focus mainly on the interpretation of printed maps and there are no items which deal with constructing or sketching maps from information.

Table 54 Tests of Academic Progress

GEOGRAPHY OBJECTIVES

Code: direct / indirect

NAME OF SUBTEST	GRADE 7 — NORTH AMERICA												GRADE 8 — SOUTHERN CONTINENTS									
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
Social Studies	3/				5/	7/			13/				4/			4/	7/	13/				

NAME OF SUBTEST	GRADE 9 — CANADA								GRADE 10 — EUROPE AND ASIA											
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	
Social Studies			7/			13/			1/			7/					6/		13/	(15 items are not related)

Table 54A

Test Analysis: Specific Items Related to Objectives

Tests of Academic Progress

Objective	Subtest	Item
	Social Studies	
1.1		25, 26, 27
1.5		15, 25, 26, 27, 28
1.6		2, 3, 4, 5, 6, 7, 8
1.9		10, 11, 12, 13, 14, 33, 34, 35, 36, 37, 38, 39, 40
2.1		25, 26, 27, 28
2.4		25, 26, 27, 28
2.5		2, 3, 4, 5, 6, 7, 8
2.6		10, 11, 12, 13, 14, 33, 34, 35, 36, 37, 38, 39, 40
3.3		2, 3, 4, 5, 6, 7, 8
3.6		10, 11, 12, 13, 14, 33, 34, 35, 36, 37, 38, 39, 40
4.1		15
4.4		2, 3, 4, 5, 6, 7, 8
4.9		1, 10, 11, 12, 13, 14
4.11		10, 11, 12, 13, 14, 33, 34, 35, 36, 37, 38, 39, 40
Not related		1, 9, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

SUMMARY OF ITEM ANALYSIS

The objectives that are directly measured by the greatest number of test items are deriving information from atlas maps (7.5 and 8.4), presenting and deriving information from various sources (7.9), using thematic maps (9.3 and 10.5), constructing and interpreting charts and graphs (9.6 and 10.11). A good number of objectives are measured only sparsely or not at all. At the grade 7 level these include using atlas gazeteers to locate places (7.2), drawing cross-sections or profiles using atlas maps or simple contour maps (7.7), transferring information from a map to a cross-section to show relationships (7.8), sketching simple maps to show dominant features such as landforms (7.10), obtaining information from a variety of photo types (7.12). At the grade 8 level the following objectives are not related to any test items: deriving information from a variety of photographs (8.8), and drawing simple sketch maps or diagrams from photographs. At the grade 9 level the use of topographical maps and/or air photographs for a variety of purposes (9.1) is not measured by any of the test items. The least measured objective at the grade 10 level is sketching simple maps or diagrams to show distributions or relationships (10.7). It is obvious that many of the objectives which are not measured by any test items require knowledge and skills which cannot be readily measured by the format of a standardized group test instrument.

Of the 8 tests analysed in the Geography area, two stand out in the degree to which they measure a broad range of objectives at all grade levels.

These two tests are the Canadian Tests of Basic Skills (CTBS) with subtests in Map Reading and Using Graphs and Tables and the Sequential Tests of Educational Prograss (STEP). The Metropolitan Achievement Test also covers a fairly broad range of objectives.

8 Item Banks: An Overview

A study which relates a selection of existing tests to curriculum objectives they were not designed to evaluate raises the question of relevance in testing. One attempt to respond to this question has been the development of banks of test items from which items appropriate to a given curriculum may be drawn, and which also allow for the derivation of information on each item's statistical properties.

A brief discussion of item banks will be presented here.

ITEM BANKS

An item bank is "simply a collection of test questions organized to enable easy access to particular types of questions within the bank" (Byrne, 1976:45). Questions may be both objective-type (e.g. multiple-choice) and constructed response type (e.g. essay). They may be drawn from many sources: questions composed by teachers, drawn from old tests, from textbooks and workbooks, or items may be shared by more than one bank. When a test is specified by content area, difficulty level, and the intellectual skills to be tested, the bank acts as a storehouse from which appropriate questions may be drawn. Information on question characteristics may also be stored in the item bank.

Since a large and varied assortment of questions would be needed in order to satisfy a variety of teaching styles, question types, texts, etc., an adequate classification system must be developed. Items may be classified by number and listed in a catalogue, or they may have certain attributes which are used as identifiers, such as identity number, topic/content heading, index words, process categories (drawn, for example, from Bloom's Taxonomy), related behavioural objectives, and statistical characteristics. Information about item characteristics enables the user either to choose an item from a catalogue or, by indicating required attributes, to have the computer select the questions.

Selection from a catalogue may be of two kinds. The items may be listed in the catalogue, and the computer merely prints out those that are selected. On the other hand, the catalogue may contain a list of objectives, and in this case matching items are retrieved as well as printed by the computer. SCORE (Houghton Mifflin) and *mastery* (SRA) provide catalogues of objectives, a selection from which may form the basis of a custom-made test. In operating the bank, the user may draw out the exact number of items required, or may draw out more than the required number and make a final selection after perusal. Alternatively, the user may specify how many and what kind of items are required, and the computer may select the items and assemble the test. The method of choice suggested and used by Wood and Skurnik (1969) was to have teachers check items on examination "blueprints" based on the curriculum studied. The "blueprint" is "a document which codifies, in detail, the student attributes or behaviours which the examiner wishes to evaluate, and also the subject matter which is thought conducive to the achievement of these objectives" (Wood and Skurnik, 1969:8). Since each item on a test serves a specific purpose, and since the test as a whole is intended for different purposes (e.g. diagnosis, classification, summative or formative evaluation) and hence constructed according to different principles, the use of "blueprints" or of objectives as identifiers is advocated.

Because the users (teachers, Boards, for example) select either the items or the item attributes they require, they retain control over the development of the test; as Lippey (1974:21) says, "Their desires can be supported without requiring them to modify their instructional procedures." Moreover, items unrelated to the curriculum will be *ipso facto* excluded from the test. The content analyses presented in this report show that very few standardized tests are free of items unrelated to the Ontario Intermediate Division Curriculum, a not surprising but nevertheless perturbing consideration for teachers wanting to use these or similar instruments. The use of item banks and of appropriate selection procedures would eliminate this problem, provided the service were kept up-to-date. "Since an item bank should be a dynamic enterprise, there should be a fairly continuous evaluation of the service

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that is being provided and the stock 'on deposit'." (Wood and Skurnik, 1969:5).

Item banks may range in size from one managed by a teacher for a few classes to a large bank with thousands of items available to a whole system. (The use of item banks on a large scale allows for comparability of standards, while at the same time leaving room for the kind of variability that can accommodate local needs and interests.) In order to handle such a large bank and to construct tests for large groups of students, the assistance of a computer would be required.

COMPUTER ASSISTANCE IN TEST CONSTRUCTION

Computer assistance in testing was originally limited to scoring. A more sophisticated type of assistance not only did the scoring but also provided lists of names, scores, statistical distributions, and analyses. Now the computer can help with test construction, i.e., assist with the preparation of the test itself. While computer-assisted scoring is best suited to large-scale operations, computer-assisted preparation can be used to advantage both in large-scale operations and by individual teachers.

Computer assistance with test preparation may take the form of *item banking* or *item generation*. *Item banking* is the "storage of questions in machine-readable form" (Lippey, 1974:5). The items may be punched on cards or stored on magnetic tape. In *item generation* the computer puts together the questions; what is banked is the question prototype, and then the computer is given the parameters of the variables and an algorithm for selection of variables.

In an item bank the computer stores either the items themselves, or item attributes. Its function then is to make a selection according to the user's specifications. In systems using item generation the computer selects parts to fit a question prototype, again according to user specifications and within the parameters indicated. Item generation has a number of advantages: multiple parallel tests may be constructed, operational efficiency is increased, and costly storage is reduced.

AN EXAMPLE

The Classroom Teacher Support System (CTSS) developed by Lippey and his associates in Los Angeles is an example of an item banking system.

Originally developed for high school history, it has now been extended to cover other areas. Twenty experienced teachers were recruited one summer to develop 8000 multiple-choice questions for the original bank. Questions were classified by content, difficulty level, behaviour level (knowledge and application), and by what is called an "X" category, and includes such information as source of material, special formats, and study aids. There is a file of statistics for each question, including difficulty level, discrimination index, frequency with which students have chosen alternative answers, and the teacher rejection rate for the item. The system will score the test, if the teacher chooses, and will provide certain statistical information in addition to raw data. It has been estimated that each teacher using the system requests a test every two to four weeks. The main advantages to them appear to be time saved and assurance of question quality.

FURTHER READING

Aspects of item banking have been briefly sketched and discussed here. There is a growing literature on the subject, reflecting both the increasing popularity and variety of systems and their uses in test construction. A small sample of this literature is given as a conclusion to this discussion.

Byrne, Colin J. "Computerized Question Banking Systems: I - The State of the Art." *British Journal of Educational Technology*, 7:2 (May, 1976): 44-64.

This paper contains a brief explanation of what question banks are and how they work, and then describes in some detail a number of systems selected to illustrate the variety of those in operation. A short section on the cost of item banking is included.

Educational Technology, 13:3 (March, 1973).

This issue is devoted to the discussion of aspects of computer assistance in testing. The articles cover such aspects as the basic operation of item banks, description of some specific banks in operation, and the possibilities for further development of this aspect of computer assistance.

Lippey, Gerald (ed.). *Computer-Assisted Test Construction*. Englewood Cliffs, N.J.: Educational Technology Publications, 1974.

This book contains a series of articles on various aspects of computer assistance with test construction. Item banking, item generation, and the important aspect of item classification are discussed in some detail.

Shoemaker, David M. "Toward a Framework for Achievement Testing." *Review of Educational Research,* 45:1 (1975): 127-147.

This paper is an attempt (1) to outline the simplest possible framework for achievement testing that makes explicit the relationship between achievement tests and the instructional program, and (2) to show how achievement testing may be implemented within this framework. The author discusses the notion of "item domains", and then looks at three approaches to constructing such domains: item banking, item-forms, and the transformational-grammar approach. The advantages of item domains over standardized tests are discussed.

Wood, R. and Skurnik, L.S. *Item Banking: A Method for Producing School-Based Examinations and Nationally Comparable Grades.* Slough, England: NFER, 1969. 184 pp.

This book discusses the concept of item banking and its possibilities, and then describes a pilot study carried out in the United Kingdom, where item banks were set up and tests drawn from them according to "blueprints" constructed by teachers. The study was part of a search for appropriate examining of students at the CSE, Level 3, examination.

9 Bibliography

OVERVIEWS OF TESTING AND MEASUREMENT IN EDUCATION

The following texts are comprehensive overviews and discussions of all aspects of tests and testing. They primarily focus on norm-referenced measures.

Coffman, W. E. "Achievement Tests." In R. L. Ebel (ed.), *Encyclopedia of Educational Research.* (4th ed.) New York: Macmillan, 1969. Pp. 7-17.

This is a good overview of achievement testing. Attention is given to the history of achievement testing, types of test items, and test construction problems.

Cronbach, L. J. *Essentials of Psychological Testing.* (3rd ed.) New York: Harper and Row, 1970.

Basic text in psychological testing.

Ebel, R. L. *Measuring Educational Achievement.* Englewood Cliffs, N.J.: Prentice-Hall, 1965.

Ebel, R. L. *Essentials of Educational Measurement.* Englewood Cliffs, N.J.: Prentice-Hall, 1972.

College textbooks which cover teacher-devised tests as well as standardized tests.

Nunnally, J. C. *Educational Measurement and Evaluation.* (2nd ed.) New York: McGraw-Hill, 1972.

Payne, D. *Assessment of Learning: Cognitive and Affective.* Lexington, Ky.: Heath, 1974.

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Thorndike, R. L. (ed.). *Educational Measurement.* (2nd ed.) Washington, D.C.: American Council on Education, 1971.

Tyler, L. E. *Tests and Measurement.* (2nd ed.) Englewood Cliffs, N.J.: Prentice-Hall, 1971.

Tyler, R. W. (ed.). *Educational Evaluation, New Roles, New Means.* 68th Yearbook NSSE Part II. Chicago: University of Chicago Press, 1969.

CRITERION-REFERENCED TESTING

Block, J. H. "Criterion-referenced Measurements: Potential." *School Review* 1971, *69*, pp. 259-270.

This article first describes the growing trend of using criterion-referenced tests and then explores the need for setting standards for these types of tests.

Fremer, J. "Criterion-referenced Interpretations of Survey Achievement Tests". *Test Development Memorandum.* Princeton, N.J.: Educational Testing Service, 1972.

Glaser, R., & Cox, R. "Criterion-referenced Testing for the Measurement of Educational Outcomes". Chapter 26 in R. Weisgerber (ed.), *Instructional Process and Media Innovation.* Chicago: Rand McNally, 1968. Pp. 545-550.

Gorth, W. P., O'Reilly, R. P., & Pinsky, P. D. *Comprehensive Achievement Monitoring.* Englewood Cliffs, N.J.: Educational Technology Publications, 1975.

A comprehensive report of a long-term monitoring program designed to evaluate educational growth through criterion-referenced measurement. Guidelines are presented for designing monitoring systems and for evaluating their utility.

Hambleton, R. K., & Novick, M. R. "Towards an Integration of Theory and Method for Criterion-referenced Tests". *Journal of Ed. Measurement,* 1973, *10*, pp. 159-170.

A short theoretical paper dealing with issues of reliability and utility of criterion-referenced tests.

Millman, J. "Reporting Student Progress: A case for a criterion-referenced marking system". *Phi Delta Kappan* 1970, *4*, pp. 226-270.

Millman, J. "Criterion-referenced Measurement". Chapter 6 in W. J. Popham (ed.), *Evaluation Education*. Berkeley: McCutchan Publishing Corp., 1974.

Popham, W. J. (ed.). *Criterion-referenced Measurement*. Englewood Cliffs, N.J.: Educational Technology Publications, 1971.

This short book, which contains essays by various authors, provides a concise, readable introduction to criterion-referenced tests and the manner in which they differ from norm-referenced tests.

Novick, M. R., & Lewis, C. "Prescribing Test Length for Criterion-referenced Measurement". *American College Testing Program Technical Bulletin No. 18*. Iowa City: January 1974.

A technical paper dealing with length requirements of criterion-referenced tests.

Progex, B. B., & Mahn, L. "Criterion-referenced Measurement: The world of grey versus black and white". *Journal of Learning Disabilities*, 1973, *6*, pp. 72-84.

AFFECTIVE DOMAIN TESTING

Tyler, R. W. "Assessing Educational Achievement in the Affective Domain". *NCME Measurement in Education*, 1973, *4*, pp. 1-8.

Affective behaviour is described and attention is given to selecting objectives and appropriate evaluation techniques in this important domain.

Wight, A. R., & Doxsey, J. R. *Measurement in Support of Affective Education*. Salt Lake City, Utah: Interstate Educational Resource Service Center, January 1972.

General concerns and consideration regarding measurement in affective education are explored, primarily measurement to support the student in his learning program and the teacher as a facilitator of learning.

ISSUES IN TESTING

Amrine, M. (ed.). "Testing and Public Policy". *American Psychologist*, 1965, *20*, pp. 857-993; 1966, *21*, pp. 401-478.

These two issues of the *American Psychologist* contain testimony presented to committees of the American Congress that were investigating the criticism of the use of psychological tests, particularly paper-and-pencil personality inventories. Invited comments from government officials and other individuals are also included.

Carver, R. P. "Reading Tests in 1970 versus 1980: Psychometric versus Edumetric". *The Reading Teacher*, December 1972, pp. 299-302.

Contends that "edumetric" (criterion-referenced) reading achievement tests will replace "psychometric" (norm-referenced) ones, and that they should do so.

Ebel, R. L. "Criterion-referenced Measurements: Limitations." *School Review*, 1971, *69*, pp. 282-285.

Outlines some criticisms of criterion-referenced tests.

Goslin, D. A. "Standardized Ability Tests and Testing". *Science*, February 23, 1968, pp. 815-855.

A discussion of criticisms of group IQ and achievement tests.

Hill, G. E. "Standards for Test Users". *Measurement and Evaluation in Guidance*, 1969, *2*, pp. 141-147.

Discusses need to humanize test-giving by making individual's best interests major concern. Relates importance of educating public regarding effective programs and school personnel about effective usage. Reviews selected measurement literature.

Wardrop, J. L. *Standardized Testing in the Schools: Uses and Roles.* Monterey, California: Brooks/Cole, 1976.

In a concise way, Wardrop argues that the benefits resulting from proper use of tests outweigh the disadvantages. He maintains that most objections to standardized testing are directed not at the tests themselves but at thoughtless and inappropriate uses of tests. The intent of the book is to present as fairly as possible the arguments on both sides of the controversey, to portray the strengths and weaknesses of standardized tests, and to emphasize some cautions that a test user should keep in mind.

Weber, G. "Uses and Abuses of Standardized Testing in the Schools". Occasional Paper 22. Council for Basic Education, May 1974.

A short overview of standardized testing procedure in schools including discussion of criterion-referenced testing.

USES AND REPORTING OF TEST RESULTS

Beggs, D. L., and others. "The Effects of Various Techniques of Interpreting Test Results on Teacher Perception and Pupil Achievement". *Measurement and Evaluation in Guidance*, 1972, *5*, pp. 290-297.

In this study, the manner in which IQ test results were communicated to teachers appeared to have no significant influence on student achievement or IQ scores.

Criscuolo, N. P. "Public Release of Reading Scores". *Educational Leadership*, 1973, *30*, pp. 665-66.

Discusses the influence of public opinion, especially that of parents, on the effectiveness of reading programs.

Davis, F. B. "Testing and the Use of Test Results". *Review of Educational Research*, 1962, *32*, pp. 5-14.

Doggett, M. "Accountability in Student Evaluation". Arlington, Virginia: ERIC Document Reproduction Service, Oct. 1974.

The purpose of this project was to work with the professional staff, students, and the community of Belmont Junior High School in developing, implementing, and evaluating programs.

Hall, M. "Dissemination and Utilization of Assessment Results in Oregon". Paper presented at the Annual Meeting of the National Council on Measurement in Education. Arlington, Virginia: ERIC Document Reproduction Service, April 1975.

Jacobs, J. W. "Releasing Test Scores: Urgent or Unthinkable?" Paper presented at the American Association of School Administrators 105th annual meeting, 1973. Arlington, Virginia: ERIC Document Reproduction Service, February 1973.

Kirkland, M. C. "The Effects of Test on Students and Schools." *Review of Educational Research*, 1971, *41*, pp. 303-350.

Kirkland, R. T. "Grade Reporting." *Peabody Journal of Education*, 1971, *49*, pp. 1-2.

Read, P. B. "On the Confidentiality of Student Test Scores." Report No. 32. ERIC Clearinghouse on Tests, Measurement and Evaluation, Princeton, N.J.

Ricks, J. H., Jr. "On Telling Parents about Test Results." Psychological Corporation, Report Bull-54, New York, N.Y., December 1959.

Two principles and one verbal technique are presented for communicating to students and their parents the information obtained from testing: (1) parents have the right to know whatever the school knows about the abilities, performance, and problems of their children; (2) the school has the obligation to see that it communicates understandable and useable knowledge; and (3) preface the analysis of test results with the phrase "you (or your son/daughter) score like people who...".

Roeder, H. H. "Are today's teachers prepared to use tests?" *Peabody Journal of Education*, 1971/1972, *49*, pp. 229-240.

Stemnock, S. K. "Releasing Standardized Achievement Test Scores to the Public." Educational Research Service, Washington, D.C., November 1974.

TRENDS IN ASSESSMENT OF STUDENT ACHIEVEMENT IN ONTARIO

The following are comprehensive reports of current trends in assessing student achievement across Ontario. Data were obtained through questionnaires completed by both principals and teachers throughout the province.

Jones, L., & Wahlstrom, M. "Assessment of Student Achievement: Intermediate Division". Report to the Ministry of Education, Ontario, May 1977.

Roberts, D., Fitzgerald, K., Schweiker, R., Reid, M., & Whitmore, D. "Survey of the Use of Standardized Tests in Ontario Elementary Schools". *Test Development Papers*, 1969, *4*(1), Ontario Institute for Studies in Education.

Wahlstrom, M. W., & Danley, R. "Current Procedures and Policy for Assessment of Student Achievement in Ontario". Toronto: Ministry of Education, Ontario, January 1977.

PUBLIC PLANNING & TESTING PROGRAMS

Follettie, J. F. "Achievement Information Monitoring in Schools (AIMS): Larger Straws in the Winds of Change." Professional Paper 36. Southwest Regional Laboratory for Educational Research and Development, Los Alamitos, California. Arlington, Va.: ERIC Document Reproduction Service, May 1976.

The Southwest Regional Laboratory for Educational Research and Development (SWRL) is dedicated to the belief that individual differences among students do not stand in the way of universal quality instructional achievement in the nation's schools. Important steps towards the condition of universal instructionalized achievement are: (1) the explication of instructional proficiencies; (2) the frequent assessment of instructional proficiencies; and (3) the widespread sharing of the findings of proficiency assessment.

Hall, M. "Dissemination and Utilization of Large-Scale Test Results: Is Anybody Out There Listening? And If Not, Why Not?" Paper presented at the 60th annual meeting of the American Educational Research Association, San Francisco, 1976. Arlington, Va.: ERIC Document Reproduction Service.

The paper reviews previous research studies and conferences which have dealt with the question of whether large-scale testing programs are effective.

Haller, E. J. "Cost Analysis for Educational Program Evaluation." Chapter 7 in W. J. Popham (ed.), *Evaluation in Education.* Berkeley: McCutchan Publishing Corp., 1974.

Reinstein, B. J. "Public School Perspectives on the Uses of Large-Scale Testing Programs". Paper presented at the 60th annual meeting of the American Educational Research Association, San Francisco, 1976. Arlington, Va.: ERIC Document Reproduction Service, April 1976.

The more commonly cited uses of state and local district assessment programs are addressed. Next, the author comments on some uses of large-scale testing in school districts and some conditions that should be met if such uses are to be realized. Finally, several major obstacles inherent in developing measurement instruments and procedures in areas other than reading, language, and mathematics are discussed.

Schriber, P. E. "Cost Benefit Analysis of Comprehensive Achievement Monitoring for Classroom Evaluation" Paper presented at the Annual Meeting of the National Council of Measurement of Education, New York, February 1971. Arlington, Va.: ERIC Document Reproduction Service.

Comprehensive Achievement Monitoring (CAM) is a systematic procedure for constructing and administering longitudinal, criterion-referenced tests.